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Does local religiosity matter for bank risk-taking?

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ABSTRACT

We investigate whether local religiosity matters for risk-taking by banks. Banks headquartered in more religious areas exhibit lower stock return volatility, lower tail risk, and lower idiosyncratic risk. They also tend to be farther away from default as measured by their z-scores. But these banks command lower market valuations during normal times. These results stand up to several robustness checks, tests for mitigating endogeneity concerns, and are supported by an analysis of bank CEOs' religiosity. Moreover, banks in more religious areas remain less vulnerable to crises. To reduce risk, these banks grow their assets more slowly, hold safer assets, rely less on non-traditional banking, and provide less incentives to their executives to increase risks. Local religiosity has a more pronounced influence on risk-taking by banks for which local investors and managers are more important. Overall, this paper contributes to the literature by uncovering an important and previously unidentified determinant of risk-taking by banks, namely, religion-induced risk aversion.

1. Introduction

Do risk preferences of key stakeholders affect risk-taking by banks? While a rich literature offers numerous firm-, market-, and regulation-specific determinants of bank risk,[1] our understanding of why some banks take more risks than others still appears incomplete. For instance, recent research discovers largely unexplained bank-specific stickiness in risk-taking culture that make some banks persistently vulnerable to crises (see Fahlenbrach et al., 2012, (hereafter FPS)). Moreover, even years after the recent financial crisis, bank cultures that contributed to the crisis do not seem to have changed sufficiently (see, e.g., SIGTARP, 2013).

While existing studies offer a number of rationality-based explanations of bank risk-taking, they appear surprisingly silent on one potentially important predictor, namely, people's inherent attitudes toward risk. Recent empirical evidence that the persistence of human traits leads to stickiness in firm policies (e.g., Bertrand and Schoar, 2003; Malmendier et al., 2011) suggests that human behavior is a missing piece of the puzzle in the bank risk-taking literature. Indeed, as Hilary and Hui (2009) note, firms do not make decisions, people do. Despite scant academic research, it seems generally accepted that human elements, such as the traits and preferences of managers and investors, play a role in banks' risk-taking behavior. For instance, in a testimony to the US House of Representatives, Andrew Lo (2008) says, "Financial crises may be … a consequence of the interactions between hardwired human behavior and the unfettered ability to innovate, compete, and evolve" and "…the ultimate origin of the

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[1] Examples include competition (see, e.g., Boyd and De Nicoló, 2005; and Martínez-Miera and Repullo, 2010), size and diversification (see, e.g., Demsetz and Strahan, 1997, and Stiroh, 2004), and ownership, governance and regulation (see, e.g., Saunders et al., 1990; and Laeven and Levine, 2009).

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crisis may be human behavior...." Similarly, the comments of numerous policymakers, experts, and the news media on the recent financial crisis point to human behavior as a cause of the crisis.[2]

Whether risk preferences of key stakeholders influence a bank's risk-taking behavior is an important question, whose answer would be significant in understanding the functioning of financial institutions and have implications for regulations aimed at improving the financial system. For instance, if managers' and investors' inherent risk preferences affect banks' risk-taking, then policies for improving the financial system that only change the regulatory environment are likely to be inadequate. This paper aims to fill this gap in the literature by studying a behavioral aspect of risk-taking by banks.

This study focuses on the role of one specific aspect of human behavior, namely, risk aversion induced by local religiosity, in explaining the variation in bank risk. A rich literature across several disciplines shows that norms tied to religious identities affect economic outcomes.[3] Moreover, a growing stream of research in financial economics finds a positive relation between local religiosity and risk aversion in corporate culture (see Hilary and Hui, 2009; and McGuire et al., 2012). So, to the extent that local religiosity influences the risk preferences of banks' key stakeholders such as managers and shareholders, banks located in more religious areas are likely to take less risk.

While prior studies link religiosity to lower risk-taking in non-financial firms (e.g., Hilary and Hui, 2009), examining this issue in financial firms is important for several reasons. First, banks provide liquidity, credit, and financing, which oil the engine of the broader economy. Financial crises, when banks stop lending, usually lead to economic downturns. This study sheds light on an important, and as yet unstudied, determinant of bank risk-taking, which is important not just for the health of the financial sector, but for the entire economy. Second, the financial sector serves as a better laboratory for studying firms' risk-taking behavior and its consequences for at least two reasons: 1) banks' direct dealings in large liquid assets create more opportunities and the flexibility to engage in risky behaviors than non-financial firms (see, e.g., Levine, 2004)), and 2) banks are significantly more responsive to financial shocks than non-financial firms (Fahlenbrach et al., 2012).

However, it is not obvious a priori whether local religiosity affects banks in the same way that it affects non-financial firms, for at least two reasons. First, as discussed by Mehran et al. (2012), banks have additional stakeholders such as depositors (banks' main funding source) and the government (the deposit-insurer and residual claimant on systemic externalities), who have strong incentives to curb excessive risk-taking by banks. Second, publicly traded banks are highly regulated, monitored by multiple agencies and followed vigorously by the financial news media, all of which can curb risk-taking. So whether risk aversion induced by local religiosity influences risk-taking in banks is an open empirical question.

We find that banks headquartered in more religious areas take less risk, consistent with the view that local religiosity induces a risk averse corporate culture. In particular, local religiosity negatively predicts stock market-based risk measures, such as total, idiosyncratic, and tail risks, as well as an internal measure of risk, namely banks' likelihood of default as measured by the inverse of their z-scores. But banks in more religious areas command lower market valuations, especially during non-crisis times. These results are quite robust: they are not driven by a few banks or a few locations, and they stand up to several alternative specifications, including those for mitigating endogeneity concerns. Moreover, the results are similar when we analyze CEOs' religiosity based on where they grew up.

Although these results are not driven by crisis periods, the negative relation between religiosity and bank risk-taking becomes stronger during the crises of 1998 and 2007–08. During the crises, banks in more religious areas exhibit less financial distress of other forms as well. In particular, they lose less on nonperforming loans and reduce dividends less. Moreover, using a framework similar to that of Fahlenbrach et al. (2012), we find that banks' poor stock performance during the 1998 crisis predicts their poor performance in the crisis of 2007–08, only if they are located in less religious areas. This finding is consistent with the notion that banks in more religious areas either learn from previous crises, or they follow risk cultures and business models that are less susceptible to crises.

We dig deeper to identify potential mechanisms that lead to the observed differences in banks' risk outcomes. We find that banks located in more religious areas grow their assets more slowly, hold safer assets, rely less on non-traditional sources of income, and provide less risk-incentives to their employees and executives. Finally, we find that the relation between local religiosity and bank risk is caused by a local preference channel. In particular, we find a stronger negative influence of local religiosity on risk-taking among banks which are more likely to rely on local investors and executives, such as smaller banks and banks which likely have higher local ownership. Moreover, this effect is more pronounced among banks with higher individual ownership, consistent with the notion that risk aversion induced by religiosity is likely to affect individual investors more than it affects institutions.

Admittedly, religiosity as a risk aversion proxy comes with a measurement error because religious adherence might have other implications in addition to financial conservatism and risk aversion. However, any attenuation bias due to this error should only bias us against finding significant results. A potentially more concerning issue is that religiosity might measure other factors that are omitted from our estimation models, which might bias our results. We deal with this issue of omitted variables by controlling for many bank and location-specific variables identified by the previous literature to be important in predicting bank risk. In addition, in robustness tests, we rule out several stories about endogeneity with economic reasoning and econometric tests such as

[2] For example, *Financial Times* (September 25, 2008) writes, "The call by both Democrats and Republicans for Wall Street titans to feel some personal pain underlined the view that greedy executives were to blame for the financial crisis." Similarly, then-US Treasury Secretary Timothy Geithner said, "Most financial crises are caused by a mix of stupidity and greed and recklessness and risk-taking and hope" (*Reuters*, April 25, 2012). John Breit, formerly a top risk manager at Merrill Lynch, says that mathematical models fail because they don't account for human frailty (*NYTimes.com*, *April 3, 2013*).

[3] See, e.g., Weber (1930); Barro and McCleary (2006), La Porta et al. (1997), and Stulz and Williamson (2003). Section 2 briefly reviews this literature.

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propensity score matching and an instrumental variables technique (2SLS). We also analyze large changes in local religiosity to mitigate a potential bias coming from location-specific fixed factors omitted from the regression. Finally, we investigate the 1998 and 2007–08 financial crises as quasi-exogenous shocks to the banking system. All of these analyses support a causal relation between local religiosity and risk-taking by banks.

This paper contributes to the literature in several ways. To our knowledge, this is the first empirical study to examine a behavioral explanation of risk-taking by banks. By focusing on the financial sector's risk-taking behavior, which can have a first-order effect on economic stability and growth, this study provides new evidence regarding the role of religiosity on the economy. Second, our paper on risk-taking by financial firms complements Hilary and Hui's (2009) study of risk-taking by non-financial firms. In addition, we analyze crisis periods, uncover potential bank policies that contribute to the risks, and attempt to identify investors' and managers' risk preferences as channels through which local religiosity affects bank risk-taking.

Third, this study also contributes to the recent literature examining the effects of financial crises on banks. Numerous recent studies examine the causes and consequences of risk-taking by financial firms, especially how bank policies, practices, and regulations led to their fates during the crises.[4] Our paper is related to Fahlenbrach et al. (2012), who suggest that some banks perform poorly in successive crises due to a persistent risk culture or some aspects of their business models. This paper uncovers one source of persistence in a bank's risk culture, namely, risk-attitudes induced by local religiosity. Our paper also complements Ellul and Yerramilli (2013), who find that banks with better pre-crisis risk control measures such as a stronger and more independent risk management function face less risk during the recent crisis. Our results suggest that financial conservatism instilled into a bank's culture by local religiosity can serve as an effective risk control mechanism.

More broadly, this study contributes to the emerging literature that examines how local demographics, culture, and religion influence firms and financial markets. For instance, Stulz and Williamson (2003) document a strong influence of religion on creditor rights across countries. Several studies find that firms located in more religious areas are less likely to be involved in accounting irregularities, tax avoidance, unethical behaviors, and stock price crashes (see McGuire et al., 2012; Boone et al., 2013; Grullon et al., 2010; and Callen and Fang, 2015). Other studies examine the effects of local preferences on firms' dividend policies and innovative activities (e.g., Becker et al., 2011; and Adhikari and Agrawal, 2016), and on characteristics of institutional investments (e.g., Kumar et al., 2011).

The paper proceeds as follows. Section 2 briefly reviews the related literature and develops testable hypotheses. Section 3 describes the data and presents summary statistics. Section 4 presents our main analysis of the effect of local religiosity on bank risk and valuations. Section 5 provides evidence from religiosity of the CEO. Section 6 presents several robustness checks of our main results. Section 7 discusses the influence of religiosity on bank risk and performance in the two major financial crises during our sample period. Section 8 examines potential mechanisms underlying the differences in risk outcomes. Section 9 examines some secondary predictions of our main conjectures, such as the roles of local preferences and institutional investors. Section 10 provides an analysis of the effect of different religious groups. Section 11 concludes.

2. Related literature and hypotheses

The literature in organizational psychology provides a strong rationale for why individual preferences would influence firm behavior. For instance, Hambrick and Mason (1984) argue that managerial characteristics partly predict organizational strategic choices and performance. Similarly, Schneider (1987)'s "attraction–selection–attrition" framework asserts that "people make the place" and people's attributes are the fundamental determinants of organizational behavior. The basic premise of this framework is supported by subsequent studies in this literature (see Schneider et al.'s, 1995, review) and mounting evidence from the financial economics literature that personal traits and beliefs of key people in an organization affect its policies. For instance, prior studies find that managers' personal preferences and styles significantly influence firms' investment and financing decisions (see, e.g., Bertrand and Schoar, 2003; Malmendier and Tate, 2005; Malmendier et al., 2011; Cronqvist et al., 2012; and Hirshleifer, Low and Teoh, 2012). In addition, investors' preferences are also likely to affect firm policies (see, e.g., Becker et al., 2011). So banks that operate in social environments with different risk preferences should exhibit different risk-taking behaviors.

Understandably, part of the reason for the lack of research in this area is the difficulty in observing individual risk preferences. While direct measures of individuals' risk preferences are not readily available to researchers, previous studies in many socioeconomic disciplines have recognized religiosity as a valid proxy for risk aversion.[5] Recent literature in financial economics has also employed a community's level of religiosity as a proxy for the risk aversion of local residents in a variety of contexts. In general, this literature links religious adherence to two related behaviors: 1) lower risk-taking (e.g., Hilary and Hui, 2009; McGuire et al., 2012; Boone et al., 2013; Noussair et al., 2013), and 2) lower involvement in questionable activities (e.g., Grullon et al., 2010; and Callen and Fang, 2015). Potential explanations of these behaviors might be that most religions teach their followers to be modest with financial pursuit, to prioritize spiritual engagement over monetary gain, and to place trust in God for relief in times of fiscal and other hardships. Moreover, for religious people, utility from spiritual endeavors might substitute utility from monetary gain, which usually requires taking financial risks. Together, these notions might explain why religiosity predicts conservatism in financial decision-making.

There are at least two channels through which greater risk aversion of local residents induced by their religiosity can affect bank risk-taking. First, top executives of firms are often either local (see, e.g., Yonker, 2015) or adopt dominant local norms. Moreover, top executives are usually under-diversified because their human capital and much of their financial wealth is invested in the banks they work for,

[4] Notable explanations include corporate governance and regulation (see, e.g., Beltratti and Stulz, 2013), executive compensation (Fahlenbrach and Stulz, 2011), bank capital (Berger and Bouwman, 2013), risk control measures (Ellul and Yerramilli, 2013), and risk culture and business models (e.g., Fahlenbrach et al., 2012).

[5] See, e.g., Miller and Hoffman (1995); Diaz (2000); Halek and Eisenhauer (2001), and Osoba (2003).

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so they care greatly about bank-specific risk. Second, the literature on local bias suggests that investors hold disproportionately more local stocks in their portfolios (see, e.g., Coval and Moskowitz, 1999; Grinblatt and Keloharju, 2001; and Ivković and Weisbenner, 2005), which can make them under-diversified and make bank-specific risk important for them (see, e.g., Goyal and Santa-Clara, 2003). Moreover, firms benefit from catering to local investor preferences (see, e.g., Becker et al., 2011). In sum, higher local religiosity represents higher risk aversion of banks' local investors and managers, which should induce banks to take less risk. This notion leads to our first testable hypothesis:

H1. Banks headquartered in counties with higher levels of religiosity take less risk.

If the risk aversion of key stakeholders induced by religiosity leads banks to take less risk, it possibly narrows these banks' investment opportunity sets because policies with higher expected payoffs but higher ex ante risks become infeasible. Moreover, investors become overconfident during market upswings and their discount rate decreases (see, e.g., Gervais and Odean, 2001), so riskier bank policies with higher expected payoffs command higher market valuations. Consistent with this notion, Calomiris and Nissim (2014) find that in non-crisis times, riskier policies such as higher leverage and non-interest income contribute more to banks' market-to-book ratios, compared to crisis and post-crisis times. These arguments imply our second testable hypothesis:

H2. Banks in more religious areas have lower market valuations during normal times.

The hypothesis of a negative relation between local religiosity and bank risk-taking assumes that religiosity represents the risk preferences of local investors and managers, who are either local or adopt dominant local values. Obviously, local investors and local managerial labor markets are not equally important to all banks. For instance, local investors' preferences are perhaps less important to large banks, which are highly visible and have large and disperse shareholder bases.[6] Moreover, as Yonker's (2015) findings imply, these large banks are less likely to have a critical mass of local residents in the top management team because they do not depend on the local managerial labor market. These arguments imply our third testable hypothesis:

H3. The effect of local religiosity on bank risk-taking is more negative among banks for which local investors and local managers are more important.

3. Data and summary statistics

To test these hypotheses, we make use of Compustat Bank Fundamentals database of publicly traded depository institutions in the United States and examine their risk-taking behavior. We focus the analysis only on US banks for reasons similar to Hilary and Hui (2009). While there is more variation in religiosity across countries, it is often confounded with a country's legal and institutional characteristics that are difficult to separate from religion. The US offers a more controlled but dynamic setting well-suited for testing our hypotheses. Following the previous literature, we consider a bank's location as the location of its headquarters. This approach is reasonable because, as Pirinsky and Wang (2006) note, headquarters are usually close to a firm's core business activities. Also, following prior studies, we assume a contagion effect of local culture, i.e., residents are influenced by the dominant local culture even if they do not adhere to it.[7]

Our sample period starts in 1994, the first year with a complete coverage of all bank-related variables needed for our analysis, which became available as a result of the enforcement of Basel I; it ends in 2010, the last census year and the last year that data on religion is available. Further, we limit the sample to depository institutions (i.e., those which report tier 1 capital ratio) to ensure that the analysis is not unduly influenced by non-comparable business practices and differences in regulatory environments. Our sample period covers the two recent major financial crises of 1998 and 2007–08, which we examine separately as quasi-exogenous shocks to the banking system to improve identification. We describe our data sources below.

3.1. Religiosity and demographics

Data on religion come from the Churches and Church Membership files of the American Religion Data Archive (ARDA) website, which contains county-level religion statistics on 133 Judeo–Christian bodies every 10 years. For the main analysis of this paper, we use the datasets for 1990, 2000, and 2010. Following the previous literature (e.g., Alesina and La Ferrara, 2000; and Hilary and Hui, 2009), we obtain estimates for the intermediate years by linearly interpolating the decennial data. We also use the 1952 data to construct an instrumental variable.

Data related to most other county-level variables come from the US Census Bureau, which provides information on several demographic and economic characteristics (e.g., age, sex, race, education, income, and the proportion of married couples) for each US county for several years. We obtain the county-level data on popular votes cast for Democratic and Republican presidential candidates from the US Census Bureau, and state-level quarterly house price indices from the Federal Housing Finance Agency's website. Again, when the data are available only at larger than annual intervals, we linearly interpolate to obtain estimates for the intermediate years. Our regressions control for these county-level variables.

[6] Consistent with this idea, Becker et al. (2011) find that firms for which local investors are economically more important are more likely to respond to their demand for dividends.

[7] Consistent with this idea, Guiso et al. (2003) find that people who are raised religiously exhibit some common beliefs and preferences, even if they reject religion as adults.

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3.2. Bank financials and headquarters locations

Our main source of bank data is the Compustat Bank Fundamentals annual file, which contains financial data on publicly traded US depository institutions. For a part of the analysis, we also obtain some data from FR Y-9 statements of bank holding companies from the Bank Regulatory database accessed via Wharton Research Data Services (WRDS). We use the CRSP-Compustat merged file to obtain stock returns and headquarter locations. Data on institutional ownership comes from 13F files via Thomson Reuters, and data on CEO compensation come from ExecuComp. Most of our analysis consists of 1459 unique banks, yielding about 10,000 bank-years of observations. Sample sizes vary across the regressions of different dependent variables based on data availability.

3.3. Measuring religiosity, bank risk, and value

For the main analysis, we follow the previous literature (e.g., Hilary and Hui, 2009) and McGuire et al., 2012)) and measure a county's *Religiosity* as the number of religious adherents as reported by ARDA divided by the county's population in a year. Following prior studies, we construct three stock return-based measures of bank risk, namely, total risk, tail risk and idiosyncratic risk, and one financial statement-based internal measure of bank risk, namely a bank's z-score. *Total Risk* is the standard deviation of a bank's daily stock returns during the fiscal year; it is the risk caused by both bank-specific and systematic factors. *Tail Risk* is based on Acharya et al.'s (2010) expected short-fall measure, which is average risk conditional on returns being less than some "α"-quintile. Tail risk is an important risk measure for banks because it estimates how much a bank is likely to lose in extreme adverse events or crises.[8] Following Acharya et al. (2010) and Ellul and Yerramilli (2013), we define tail risk as the negative of the average of the 5% worst daily returns (i.e. $\alpha = 5\%$) of a bank's stock over the fiscal year. The third variable of interest is *Idiosyncratic Risk*, which measures risks coming from a bank's own actions. We calculate *Idiosyncratic Risk* as the standard deviation of residuals obtained from Fama–French and Carhart's four-factor regression estimated using daily stock returns for a fiscal year.

Following the previous literature (see, e.g., Laeven and Levine, 2009), we examine a bank's z-score as an internal measure of its solvency. A higher z-score indicates that a bank is more solvent. For each bank-year, we construct the z-score by adding the bank's return on assets (ROA) to its capital to assets ratio (CAR) and dividing the sum by the standard deviation of ROA (i.e., $\frac{ROA+CAR}{\sigma(ROA)}$).[9] Following the prior literature, we take the natural logarithm of the z-score to reduce its skewness and multiply it by −1 to make a larger number reflect a higher risk (*ZScoreInverse*).

We measure a bank's valuation using *Tobin's Q*, computed as the book value of assets plus the market value of equity minus the book value of equity, divided by the book value of total assets. As Laeven and Levine (2007) point out, *Tobin's Q* is a valuation measure that can be used to compare banks, without the need to adjust for risk or leverage.

Our regressions control for a number of bank characteristics that are likely to influence banks' risk-taking behavior (see, e.g., Ellul and Yerramilli, 2013). Accordingly, we control for bank size, profitability (ROA), the proportion of nonperforming assets (NPL Ratio), loans-to-assets ratio, deposit-to-assets ratio, tier 1 capital ratio, proportion of non-interest income, and a dummy variable for M&A activities. In regressions of z-score, we do not control for ROA and tier 1 capital ratio because z-score is calculated by using ROA and capital ratio. In addition to bank-specific variables, we also control for a number of contemporaneous county-level variables such as population, age structure, education (fraction of college graduates), female and minority population ratios, fraction of Republicans, and state-level real per capita income. We also control for state-level lagged house price growth. All regressions include year fixed effects and are estimated with standard errors that are corrected for heteroskedasticity and are clustered at the bank level.[10] The Appendix defines all the variables in our regressions.

Panel A of Table 1 presents summary statistics at the county level, where an observation corresponds to the latest year of available data for a county in which a bank exists or has ever existed during our sample period. Most of our analysis covers about 673 (out of over 3000) US counties that contain the headquarters of at least one publicly traded bank. A mean (median) of about 49% (48%) of a county's residents adhere to any religion. The mean (median) state-level deflated per capita income is $46,470 ($42,234) in 2005 dollars. The population distribution across counties is highly skewed, with a mean (median) population of about 270 (114) thousand. About 24% of a county's residents are college graduates and about 51% of the population is female. The typical (i.e., median) bank is located in an urban area (rural urban continuum ≤3), with a minority population of about 11%. A county has both mean and median age group of about 8, which corresponds to 35–40 year olds. The state-level mean (median) growth rate of house prices is 1% (0.4%) per year. Compared to the typical US county (untabulated), the counties in our sample are more highly populated, have more educated residents, have higher per capita incomes, and are slightly less religious.

Panel B displays summary statistics at the bank-year level, which we later use to infer the economic significance of our regression estimates. Due to the non-uniform distribution of bank-years across counties, the summary statistics at the county and bank level are not identical. The average bank-year corresponds to a county which has 51.6% of its population as religious adherents, among which 22.3% are Catholics, 24.8% are Protestants, and 2% are Jewish. The average annual total, tail, and idiosyncratic risks are 0.027, 0.056, and 0.025, respectively, with the negative of the natural log of z-score (*ZscoreInverse*) of −3.13 and Tobin's Q of 1.044. All continuous variables are winsorized at 1% in both tails.

[8] In other words, tail risk is the expected loss conditional on loss being greater than Value-at-Risk (VaR).

[9] The probability that current losses would exceed the capital is less than or equal to $1/z^2$ (see, Roy, 1952), so an increase in z-score implies a decrease in the upper-bound on the probability of default, i.e., suggests a greater distance to default. The z-score calculated this way is a time-varying measure because the numerator changes every year, even though the denominator varies only in the cross-section.

[10] As discussed in Section 5, all of our main results hold when clustering standard errors at the county level.

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Table 1
Summary statistics.
The table reports summary statistics of our key variables of interest. Panel A shows demographic and economic indicators at the county-level for the latest year that a county appears in the sample. Panel B shows the descriptive statistics at the bank-year level. The sample consists of publicly traded banks in Compustat Bank Fundamentals and CRSP databases from 1994 to 2010. All variables in the regressions are defined in the Appendix.

Panel A: Summary statistics at the county-level.

	Obs.	Mean	Std. Dev.	Q1	Median	Q3
Religiosity	673	0.487	0.129	0.388	0.479	0.576
Catholics	673	0.161	0.132	0.054	0.130	0.237
Mainline Protestants	673	0.107	0.060	0.064	0.095	0.143
Other Protestants	673	0.181	0.133	0.087	0.137	0.250
Jewish	673	0.004	0.013	0.000	0.001	0.004
Population	673	269,922	377,082	48,746	113,924	301,356
Real income (2005 $)	673	46,470	6960	42,234	44,945	50,671
Fraction college grads	673	23.947	9.891	16.080	21.929	29.725
Female population ratio	673	0.509	0.011	0.505	0.510	0.516
Rural urban continuum	673	3.035	1.934	1.000	3.000	4.000
Minority population Ratio	673	0.162	0.144	0.050	0.112	0.234
Republican ratio	673	0.513	0.123	0.439	0.511	0.602
House price growth	673	0.010	0.036	−0.006	0.004	0.027
Average age group	673	8.131	0.511	7.781	8.117	8.450

Panel B: Summary statistics at the bank-year level.

	Obs.	Mean	Std. Dev.	25th	Median	75th
Religiosity	12,233	0.516	0.124	0.425	0.515	0.601
Catholics	12,233	0.223	0.154	0.083	0.198	0.351
Protestants	12,233	0.248	0.143	0.131	0.209	0.338
Mainline Protestants	12,233	0.107	0.061	0.060	0.097	0.142
Jewish	12,233	0.020	0.034	0.001	0.006	0.023
Total risk	11,173	0.027	0.017	0.017	0.022	0.030
Tail risk	11,173	0.056	0.034	0.035	0.047	0.065
Idiosyncratic risk	11,173	0.025	0.017	0.015	0.021	0.029
ZScoreInverse	12,233	−3.134	1.174	−3.860	−3.280	−2.510
Tobin's Q	12,233	1.044	0.064	0.999	1.033	1.077
NPL ratio (%)	10,728	1.053	1.597	0.254	0.534	1.124
Div. payout	9532	0.004	0.003	0.001	0.004	0.006
Asset growth	10,728	0.108	0.144	0.026	0.080	0.155
Options grant	4259	0.898	0.958	0.000	0.718	1.766
CEO vega	1479	126.907	234.709	0.000	12.031	38.834
Total assets	10,728	10,168.95	76,759.85	368.37	792.30	2240.20
ROA	10,728	0.007	0.010	0.006	0.009	0.012
Loans/assets	10,728	0.652	0.130	0.582	0.665	0.740
Deposits/assets	10,728	0.754	0.104	0.691	0.771	0.832
Tier 1 capital ratio	10,728	11.416	3.797	8.890	10.870	13.200
Non-interest income	10,728	0.194	0.145	0.113	0.180	0.258
Acquisition activity	10,728	0.053	0.224	0.000	0.000	0.000
Log(real income)	12,233	10.750	0.146	10.668	10.729	10.854
Fraction college grads	12,233	25.891	9.748	18.310	25.100	31.300
Log(population)	12,233	12.547	1.279	11.518	12.755	13.608
Average age group	12,233	7.892	0.469	7.572	7.878	8.184
Rural urban continuum	12,233	2.192	1.757	1.000	2.000	3.000
Female population ratio	12,233	0.513	0.011	0.507	0.514	0.519
Minority population ratio	12,233	0.184	0.140	0.073	0.158	0.256
Republican ratio	12,233	0.470	0.126	0.383	0.477	0.559
Local bank concentration	12,233	0.712	0.281	0.488	0.730	1.000
House price growth	12,233	0.028	0.048	0.006	0.030	0.047

4. Baseline results

We begin by showing some preliminary relations among our key variables of interest via univariate tests and correlations in Section 4.1, followed by multivariate tests in Section 4.2.

4.1. Sorting results and correlations

Panel A of Table 2 presents the means of our main dependent variables of interest, viz., *Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, *ZScoreInverse*, and *Tobin's Q* across the three terciles of the counties' *Religiosity* levels. The terciles are formed each year during the sample. The last column of Panel A shows the point estimates and statistical significance of the differences in the means of these variables between the highest and the lowest terciles.

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As expected, there is a monotonic decrease in the means of *Total Risk*, *Tail Risk*, and *Idiosyncratic Risk* across increasing religiosity terciles. Moreover, for each of the three variables, the mean of the highest religiosity tercile is statistically different from the mean of the lowest tercile. For *ZscoreInverse* and *Tobin's Q*, while the decrease is not monotonic, the average of the top tercile is less than the average of the bottom tercile, and the difference is statistically significant for *ZscoreInverse*.

Panel B of Table 2 presents the unconditional pairwise correlations among some key variables of interest, where all non-italicized correlation coefficients are significantly different from zero at the 5% level or better. As expected, the univariate correlations between *Religiosity* and all measures of bank risk are negative and statistically significant. *Size* is negatively correlated but $Size^2$ is positively and significantly correlated with the first three measures of risk. Moreover, the correlation between *Religiosity* and *Tobin's Q* is also negative. All risk variables are negatively correlated with *ROA* and are positively correlated with the ratio of nonperforming loans to total loans (*NPL Ratio*). Most of the county-level control variables are significantly correlated with bank risk and valuation measures. Therefore, our regressions control for these county-level variables, in addition to bank-level variables.

4.2. Multivariate analysis

The univariate analysis suggests that the level of a county's religiosity is negatively related to the levels of bank risk and valuation. We now examine whether these relations hold after controlling for other potential determinants of bank risk and valuation. We estimate the following regression:

$$BankRisk_{i,k,t} \text{ or } BankValue_{i,k,t} = \alpha + \beta Religiosity_{k,t} + \gamma \text{BankLevelControls}_{i;t-1} + \delta \text{CountyLevelControls}_{k,t} + Year_t + \varepsilon_{i,k,t,} \quad (1)$$

where *i*, *k*, and *t* index bank, county, and year, respectively. The dependent variable *BankRisk* is one of our four measures of bank risk, and *BankValue* is a bank's *Tobin's Q* as a measure of its market valuation. *BankLevelControls* is a vector of bank-specific control variables similar to those used by Ellul and Yerramilli (2013). Specifically, we control for size using the natural logarithm of book value of total assets. Since size might have a nonlinear effect on risk and valuation, we also control for size-squared. Following Ellul

Table 2
Univariate evidence.
The first three columns in Panel A show the means of the five main variables of interest across three terciles of *Religiosity*. The last column of panel A shows point estimates of the differences in means between the highest and the lowest terciles. Panel B reports Pearson correlation coefficients among select variables of interest. All non-italicized correlation coefficients in Panel B are statistically significant at the 5% level or better. All variables used in the regression analyses are defined in the Appendix.

Panel A: Means of variables sorted by *Religiosity* terciles.

	Religiosity tercile			
	Low	Medium	High	High–Low
Total risk	0.027	0.026	0.024	−0.002***
Tail risk	0.057	0.055	0.052	−0.005***
Idiosyncratic risk	0.025	0.024	0.022	−0.003***
ZScoreInverse	−3.146	−3.109	−3.248	−0.102***
Tobin's Q	1.047	1.048	1.045	−0.001

Panel B: Pearson correlations.

	Total Risk	Tail Risk	Idio. Risk	ZScoreInverse	Tobin's Q	NPL Ratio	Div. Payout
Religiosity	−0.03	−0.04	−0.03	−0.06	−0.04	−0.05	*0.00*
Size	−0.17	−0.18	−0.28	0.13	0.18	−0.07	0.20
$Size^2$	0.05	0.06	0.03	−0.02	−0.04	−0.06	0.05
ROA	−0.14	−0.14	−0.14	−0.13	*0.01*	−0.03	0.05
Loans/assets	*0.00*	0.02	*0.00*	−0.05	0.02	0.14	*0.02*
Deposits/assets	0.07	0.07	0.08	0.03	0.04	*0.01*	*−0.02*
Tier 1 capital ratio	−0.11	−0.11	−0.12	−0.26	0.08	−0.11	0.13
NPL ratio	0.51	0.50	0.49	0.32	−0.25	1.00	−0.25
Non-interest income	*0.00*	*0.00*	−0.04	0.09	0.15	0.03	0.03
Log(real income)	0.07	0.06	0.06	0.04	0.06	0.08	0.16
Fraction college grads	0.03	0.02	0.00	0.11	0.08	0.03	−0.11
Log(population)	0.03	0.02	*0.01*	0.20	0.06	*−0.01*	−0.09
Average age group	−0.01	*0.00*	−0.02	−0.06	−0.04	0.08	−0.13
Rural urban continuum	−0.04	−0.03	−0.03	−0.17	−0.03	0.03	0.06
Female population ratio	−0.03	−0.04	−0.04	*−0.01*	*0.00*	−0.07	0.13
Minority population ratio	*0.00*	*0.00*	−0.02	0.10	0.06	0.02	0.02
Republican ratio	−0.03	*−0.02*	0.00	−0.07	−0.03	−0.02	−0.08
House price growth	−0.33	−0.34	−0.29	−0.09	0.32	−0.36	0.08
Local bank concentration	−0.06	−0.06	−0.07	−0.09	−0.03	0.05	0.06

*** Statistical significance at the 1% level.

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and Yerramilli (2013), we orthogonalize size and size-squared before using them in the regressions because these two variables are very highly correlated. Other control variables include measures of profitability (i.e., ROA), balance sheet composition such as the ratio of deposits to assets, tier 1 capital ratio, loans to assets ratio, non-interest income to total income ratio, and the ratio of nonperforming loans to total loans. In addition, we control for a bank's engagement in M&A activities by using a dummy variable indicating non-zero acquisition expense. To mitigate the possibility of reverse causality, all bank level control variables are lagged by 1 year in the regressions.

CountyLevelControls is a vector of contemporaneous county-level control variables, which comprise a number of demographic and economic indicators similar to those used by related previous studies (see, e.g., Hilary and Hui, 2009; and Kumar et al., 2011). These control variables help reduce the concerns about an omitted variables bias arising from the possibility that *Religiosity* might be correlated with other location-specific characteristics important for bank risk-taking. Specifically, we control for county population, education level as proxied by the proportion of college graduates, age composition, female population ratio, minority population ratio, the dominant political belief proxied by the fraction of Republican voters, and state-level real per capita income. In addition, we control for lagged concentration of local banks, calculated as the Herfindahl–Hirschman index (HHI) of deposits among banks headquartered in the county during the year, as a measure of local bank competition. Finally, recognizing the role of the local housing market for banks' risk-taking behavior, we control for the lagged house price growth rate in the state of a bank's headquarters. All the variables in the regressions are defined in the Appendix.

Panel A of Table 3 presents the results of regressions of different measures of bank risk and valuation for the full sample. In column 1, *Religiosity* obtains a negative coefficient in explaining *Total Risk* and is statistically significant at the 1% level. Consistent with our hypothesis, this result suggests that banks located in more religious areas exhibit lower stock return volatilities after controlling for a host of bank-specific and county-specific variables. In economic terms, the estimated coefficient of −0.006 on *Religiosity* suggests that a one standard deviation increase in the fraction of religious adherents leads to a decrease of about 0.0007 (=−0.006*0.124) in *Total Risk*, which is about 4.1% of its standard deviation.

Similarly, in column 2, *Religiosity* assumes a negative and highly significant coefficient in predicting *Tail Risk*. The point estimate of −0.012 suggests that, on average, banks in more religious counties experience less extreme negative returns. In terms of economic significance, a one standard deviation increase in *Religiosity* leads to a decrease of 0.0015 in *Tail Risk*, which is about 4.4% of its standard deviation.

In column 3, the results are similar when we examine *Idiosyncratic Risk*, which captures the risk caused by a bank's own actions, rather than by systematic factors. The religiosity variable once again obtains a negative and statistically highly significant coefficient in explaining *Idiosyncratic Risk*. This result reveals that higher level of local religiosity leads to less risk that arises because of a bank's own actions. Here, a one standard deviation increase in local religiosity leads to a decrease in idiosyncratic risk by 4.4% of its standard deviation.

To offer a big picture of the economic significance of these effects, we compare the economic magnitude of *Religiosity* in predicting risks to that of *Non-interest Income*, which previous studies have found to be of first-order importance for bank risk (see, e.g., DeYoung and Roland, 2001; Stiroh and Rumble, 2006; and Brunnermeier et al., 2012). Similar calculations reveal that a one standard deviation *decrease* in *Non-interest Income* leads to decreases in total, tail, and idiosyncratic risks by 4.3%, 4.3%, and 3.4% of their respective standard deviations, which are comparable to the impact of local religiosity.

We next examine whether local religiosity also affects an internal measure of a bank's risk, viz. its *ZScoreInverse*, widely used in the banking literature as a measure of a bank's proximity to default. Column 4 presents the estimate of the regression of *ZScoreInverse*. Control variables include all the variables in column 1 to 3 except tier 1 capital ratio and ROA because similar variables are used to compute the z-score. The regression of *ZScoreInverse* also obtains a negative coefficient on *Religiosity*, which is statistically significant at the 1% level. Since *ZScoreInverse* is a measure of proximity to default, the negative coefficient implies that banks in more religious areas tend to remain farther from default than those in less religious areas. In economic terms, the estimated coefficient of −0.752 suggests that a one standard deviation increase in the fraction of local religious adherents decreases *ZScoreInverse* by .093, which is about 7.9% of its standard deviation. All these results support our first hypothesis that banks headquartered in counties with higher levels of religiosity take less risk.

Most control variables obtain expected signs in predicting the risk variables. Bank size has a nonlinear effect on the first three measures of risk. Specifically, negative coefficient estimates on *Size* but positive on $Size^2$ suggest that larger size helps reduce risks up to a point (perhaps because of diversification), after which size contributes positively to risk (plausibly due to the acquisition of riskier assets). Not surprisingly, profitability (*ROA*) is negatively related to risk, while *NPL Ratio* is positively related to it. Better capitalized banks (with higher *Tier 1 Capital Ratio*) exhibit lower risks. Consistent with prior findings, the share of non-interest income is positively related to risk, implying that banks which generate more income from non-traditional banking activities are exposed to higher risks. Among county-level control variables, local population size seems to have a positive effect on bank risk, suggesting that opportunities created by larger local populations motivate banks to take more risk. There is some evidence that banks that are located in low-income areas and areas with larger minority populations exhibit higher risk.

Finally, in column 5, we investigate the effect of religiosity on the market valuation of banks as measured by their *Tobin's Q*. After controlling for numerous bank-level and county-level variables, *Religiosity* negatively predicts a bank's Tobin's Q. This result suggests that holding other determinants of a bank's valuation constant, banks in more religious counties tend to be valued less by the market. The point estimate of −0.029 implies that a one standard deviation increase in local religiosity decreases a bank's Tobin's Q by 0.0036, which is about 5.6% of its standard deviation.

Our sample period covers two major crisis episodes that significantly affected US financial institutions. The first is the crisis caused by Russia's default on its debt, which led to a collapse of Russian stock and bond markets on August 13, 1998. The second is the recent

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Table 3
Religiosity, bank risk, and valuation.
The table reports estimates of regressions of risk outcomes (*Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, and *ZScoreInverse*) and valuation (*Tobin's Q*) on the religiosity proxy, *Religiosity*. All the variables are defined in the Appendix. All bank-level independent variables, the measure of bank concentration and state house price growth are lagged by 1 year. Other county-level control variables are contemporaneous. Panel A shows the results of regressions for the full sample and panel B shows the results on subsample that excludes crisis periods (i.e., fiscal years 1998 (if it ended after July), 2007 and 2008). All regressions include year dummies. Intercepts are not reported. Standard errors are corrected for heteroscedasticity and are clustered at the bank level, and *t*-statistics are in parentheses.

Panel A: Full sample.

	(1) Total risk	(2) Tail risk	(3) Idiosyncratic risk	(4) ZScoreInverse	(5) Tobin's Q
Religiosity	−0.006***	−0.012***	−0.006***	−0.752***	−0.029***
	(−4.02)	(−3.59)	(−3.77)	(−3.15)	(−3.03)
Size	−0.002***	−0.005***	−0.004***	0.070*	0.024***
	(−9.76)	(−10.96)	(−17.75)	(1.82)	(15.79)
Size^2	0.001***	0.003***	0.001***	−0.038	−0.004***
	(6.50)	(7.72)	(4.73)	(−1.57)	(−3.52)
ROA	−0.329***	−0.643***	−0.326***		1.484***
	(−9.55)	(−9.69)	(−9.45)		(9.10)
NPL ratio	0.003***	0.005***	0.003***	0.340***	−0.001
	(11.58)	(11.80)	(11.75)	(16.12)	(−1.44)
Loans/assets	−0.002	−0.003	−0.002	0.320	−0.009
	(−1.07)	(−0.86)	(−1.18)	(1.49)	(−0.97)
Deposits/assets	0.010***	0.020***	0.009***	−0.449	0.106***
	(5.21)	(4.98)	(4.80)	(−0.95)	(9.51)
Tier 1 capital ratio	−0.000***	−0.000***	−0.000***		0.002***
	(−4.41)	(−4.69)	(−5.34)		(6.18)
Non-interest income	0.005***	0.010***	0.004**	0.024	0.013
	(3.13)	(3.20)	(2.43)	(0.12)	(1.55)
Acquisition activity	0.000	0.001	−0.002***	0.021	−0.012***
	(0.15)	(0.47)	(−2.92)	(0.29)	(−4.69)
Log(real income)	−0.003*	−0.006*	−0.002	−0.185	0.006
	(−1.79)	(−1.87)	(−1.45)	(−0.83)	(0.73)
Fraction college grads	−0.000	−0.000	−0.000	0.002	0.000
	(−1.05)	(−1.28)	(−0.72)	(0.54)	(0.83)
Log(population)	0.001*	0.001*	0.000	0.111**	0.001
	(1.81)	(1.79)	(1.43)	(2.51)	(0.74)
Average age group	0.000	−0.000	0.000	0.063	0.001
	(0.12)	(−0.18)	(0.81)	(0.81)	(0.33)
Rural urban continuum	−0.000	−0.000	−0.000	−0.031	−0.001
	(−0.88)	(−0.70)	(−1.23)	(−1.04)	(−1.12)
Female population ratio	−0.007	−0.017	−0.007	−5.142*	0.059
	(−0.36)	(−0.41)	(−0.35)	(−1.66)	(0.54)
Minority population ratio	0.002	0.005	0.004**	0.377	−0.002
	(1.44)	(1.42)	(2.50)	(1.46)	(−0.16)
Republican ratio	0.000	0.001	0.002	0.318	0.015
	(0.19)	(0.33)	(1.02)	(1.05)	(1.29)
House price growth	−0.002	−0.006	−0.001	−0.359	0.169***
	(−0.35)	(−0.57)	(−0.20)	(−0.84)	(8.90)
Local bank concentration	−0.000	−0.001	−0.001	0.076	−0.003
	(−0.36)	(−0.51)	(−0.67)	(0.72)	(−0.84)
Constant	0.050**	0.111**	0.040*	−0.824	0.805***
	(2.23)	(2.44)	(1.85)	(−0.28)	(7.55)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	9018	8995	9018	11,063	10,199
Adj. R^2	0.553	0.571	0.533	0.195	0.480

Panel B: Excluding crisis periods.

	(1) Total Risk	(2) Tail Risk	(3) Idiosyncratic Risk	(4) ZScoreInverse	(5) Tobin's Q
Religiosity	−0.006***	−0.010***	−0.005***	−0.714***	−0.028***
	(−3.43)	(−3.14)	(−3.20)	(−3.04)	(−2.94)
Bank-level controls	Yes	Yes	Yes	Yes	Yes
County-level controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	7601	7581	7601	9354	8537
Adj. R^2	0.546	0.557	0.531	0.196	0.494

* Statistical significance at the 10%.
** Statistical significance at the 5%.
*** Statistical significance at the 1% level.

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US financial crisis of 2007–08, triggered by the collapse of housing markets. So one concern is whether these results are driven by crisis periods, which often bring about large structural breaks in risk and return distributions. Moreover, since religiosity is measured at the county level, another worry is that the observed relation between local religiosity and risk may be an artifact of differences in banks' exposure to local real estate markets during the latter crisis.

To address these issues, we repeat all the regressions by excluding fiscal years 1998 (if they end in August or later), 2007, and 2008 from the sample.[11] This subsample also allows us to test our second hypothesis that banks in more religious areas have lower market valuations during *normal* times. Panel B of Table 1 shows the results of the regression on this subsample. For brevity, we report only the coefficients on *Religiosity*. All our results from the full sample analysis continue to hold in this subsample for each of the risk and valuation measures, verifying that these results are not merely driven by crises and banks' exposure to local real estate markets. However, in most regressions, both point estimates and t-statistics on *Religiosity* decrease slightly, which suggests that the relation between local religiosity and bank risk became more negative during the crises. Moreover, prior studies find that crisis periods are special and are worth studying separately. So in Section 6, we analyze whether the relation between local religiosity and risk-taking changes during the crises.

5. Evidence from religiosity of the CEO

Our baseline results show robust evidence that local religiosity negatively predicts banks' risk-taking behavior. This effect persists even after controlling for numerous bank-level and county-level variables that might be correlated with religion. Despite this, a lingering concern is that our results might be driven by geographical fixed effects related to bank headquarters locations. To dispel such concerns, in this section, we consider the religiosity of bank CEOs instead of local religiosity near bank headquarters.

We obtain data on the state where a CEO grew up for banks in the S&P 1500 group from Scott Yonker,[12] who studies the effect of local CEOs on the policies of non-financial firms (see Yonker, 2015). We calculate the proportion of religious people in a CEO's home state in the year 1990 (a few years before the beginning of Execucomp data) and use it as our measure of the CEO's religiosity (*CEORel*). This approach to measuring CEOs' personal religiosity is motivated by the finding of Guiso et al. (2003) that religiosity while growing up affects people's decisions later in life, whether or not they remain religious as adults.

Several features of the data are worth noting. First, the CEO is from the state of bank headquarters in about 46% of our sample (see Table A.1 of the Internet appendix (IA)), a proportion that is larger than the 30% rate for non-financial firms found by Yonker (2015). Not surprisingly, the correlation between *CEORel* and our main local *Religiosity* variable is a significantly positive 0.41. These results suggest that local religiosity also partly captures CEO religiosity. Moreover, there is a significant variation in the proportion of local CEOs across bank size. For example, about 62% of the bank-years in the smallest quintile by total assets have local CEOs, while this proportion is only 27% for banks in the highest quintile. This feature justifies our third hypothesis that the effect of religiosity should be larger in smaller banks.

On the other hand, this subsample of banks in the S&P 1500 are substantially larger than the rest of the banks on Compustat. Specifically, the mean (median) asset size of banks in the S&P 1500 is 15 (20) times larger than the rest. This feature of the data significantly biases us against finding any results in this subsample because, as discussed earlier, we expect our results to hold mainly in smaller banks.

Despite these odds, we find in panel A of Table 4 that *CEORel* negatively predicts all four measures of bank risk. The coefficient is negative but statistically insignificant for Tobin's Q. Alternatively, we rank *CEORel* variable into quintiles and create a variable called *CEORelQuintle*, which takes value ranging from 1 (low) to 5. This approach generates greater variation in the distribution of religiosity within this smaller sample. In panel B, *CEORelQuintle* also negatively predicts all four measures of risks, with improved statistical significance.

These results from CEOs religiosity alleviate concerns about geographic fixed effects. However, this is a small subsample of banks that are much larger than the banks in our full sample, and thus does not represent the sample of our primary interest. Moreover, our hypotheses are based on both managers' (CEO and other top managers) and investors' preferences, while CEO religiosity captures only the CEO's preference. Therefore, in subsequent analyses, we analyze the full sample and use our measure of local religiosity.

6. Robustness

6.1. Alternate specifications

We next conduct a rich set of robustness tests of our main results. In general, these tests examine if the results hold in different subsamples, and other plausible specifications including those aimed at mitigating endogeneity concerns. Table 5 summarizes these results. The five sets of two columns each show the regression estimates of *Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, *ZScoreInverse*, and *Tobin's Q*, respectively. For each variable, the first column reports the coefficient estimate on *Religiosity*, followed by the numbers of observations. Row 0 reports the results from our baseline specification in Table 3, Panel A for comparison.

[11] We define the crisis periods similarly to Fahlenbrach et al. (2012) and Ellul and Yerramilli (2013).

[12] We thank Scott Yonker for sharing this novel hand-collected data.

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Table 4
Test using the religiosity of the CEO's home state.
Panel A of the table reports estimates of regressions of risk outcomes (*Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, and *ZScoreInverse*) and valuation (*Tobin's Q*) on inferred religiosity of bank CEOs (*CEORel*). *CEORel* is defined as the percentage of religious adherents in 1990 in the state where the CEO grew up. Panel B replaces *CEORel* with *CEORelQuintile*, which is the quintile ranking of *CEORel*. All bank-level independent variables, the measure of bank concentration and state house price growth are lagged by 1 year. Other county-level control variables are contemporaneous. All regressions include year dummies. Intercepts are not reported. Standard errors are corrected for heteroscedasticity and are clustered at the bank level, and t-statistics are in parentheses.

Panel A: Religiosity of CEOs' home state.

	(1) Total risk	(2) Tail risk	(3) Idiosyncratic risk	(4) ZScoreInverse	(5) Tobin's Q
CEORel	−0.005**	−0.010*	−0.004*	−1.086*	−0.035
	(−2.14)	(−1.86)	(−1.75)	(−1.65)	(−0.98)
Bank-level controls	Yes	Yes	Yes	Yes	Yes
County-level Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	1142	1142	1142	1231	1187
Adj. R^2	0.776	0.759	0.672	0.292	0.534

Panel B: Religiosity quintile of CEOs' home state.

	(1) Total risk	(2) Tail risk	(3) Idiosyncratic risk	(4) ZScoreInverse	(5) Tobin's Q
CEORelQuintile	−0.0005***	−0.0009**	−0.0003**	−0.0915*	−0.0028
	(−2.62)	(−2.35)	(−2.02)	(−1.94)	(−1.05)
Bank-level controls	Yes	Yes	Yes	Yes	Yes
County-level Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	1142	1142	1142	1231	1187
Adj. R^2	0.777	0.759	0.672	0.293	0.534

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

First, since our main variable of interest is the level of religiosity of the county of a bank's headquarters, one concern is whether the results are driven by a few banks in highly religious or highly secular areas. As shown in row 1, our conclusions remain unchanged when we exclude all the counties in the five most religious US states (MS, UT, AL, LA, and AR) from the sample. Results also hold when we exclude all the counties in the five least religious states (VT, NH, ME, MA, and RI), as shown in row 2.

We next examine whether our results are driven by California and New York, the two states with the largest financial centers. In row 3, our results are essentially unchanged when we exclude these two states from the sample. Note that row 2 excludes Massachusetts, another state with a large financial center.

Bushee et al. (2011) point out that cities like New York, Boston, Chicago, and San Francisco serve as hubs of financial information because they attract sophisticated market participants. A concern is that these top money centers thus might take more risk because of better access to information, and they may also be less religious due to their large metropolitan environment. We first check whether these top money centers exhibit lower religiosity than the rest of the country. We find that these areas are actually more religious (58% vs. 51% for the rest of the sample), possibly because they have larger immigrant populations that may be more religious. Nevertheless, as shown in row 4, our results do not change when we add a dummy variable indicating the nine counties that these four cities belong to.[13]

The next robustness test examines the influence of "too-big-to-fail" banks which likely have greater incentives to take risks because they believe they would be bailed out by the government, if they get into trouble. Since most of these big banks are located in large cities, which may be more secular, a potential concern is whether these few banks might be driving our results. Because there is no official definition of "too-big-to-fail," we follow Berger et al. (2013) and exclude all bank-years with real total assets that exceed $100 billion from the sample. In row 5, all our conclusions remain intact when we do so. This finding suggests that our results are not driven by these very large banks.

Endogeneity is less of a concern for our analysis because counties' cultural compositions, including religiosity, usually predate our sample banks and remain fairly stable over time. So, our main explanatory variable of interest, the level of a county's religiosity, is mostly exogenous to the policies of local banks. However, one can argue that an endogeneity problem might arise because banks self-select their locations according to their business models and risk preferences. For instance, to take advantage of local investor or executive preferences for risk, riskier banks might locate in places with more risk-tolerant residents. Alternatively, a county's demographic composition, including its religiosity, might respond to the policies of local firms. For instance, people seeking employment and investment opportunities may move to places that are culturally closer to their preferences, including preferences about risk. These possibilities add to the challenge of establishing a causal link between local religiosity and bank risk.

[13] In particular, the dummy variable indicates the following counties: Bronx, Kings, New York, Queens, Richmond (for New York City, NY); Suffolk (for Boston, MA); San Francisco (for San Francisco, CA); Cook, DuPage (for Chicago, IL).

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Table 5
Robustness tests.*
This table reports the coefficient of Religiosity from alternative specifications of the regressions of *Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, *ZScoreInverse*, *and Tobin's Q*. The main specification shown in row 0 is the regression on the full sample with the complete set of controls, shown in columns 1 through 5 of Table 3, Panel A. Standard errors are corrected for heteroscedasticity and are clustered at the bank-level, except in test 8, where they are clustered at the county level.

	Total risk		Tail risk		Idiosyncratic risk		ZScoreInverse		Tobin's Q	
	Coeff.	Obs.	Coeff.	Obs.	Coeff.	Obs.	Coeff.	Obs.	Coeff.	Obs.
0. Main specification	−0.006***	9018	−0.012***	8995	−0.006***	9018	−0.752***	11,063	−0.029***	10,199
1. Remove five most religious states (MS, UT, AL, LA, AR)	−0.006***	8480	−0.010***	8458	−0.005***	8480	−0.755***	9803	−0.025**	9643
2. Remove five least religious states (VT, NH, ME, MA, RI)	−0.007***	8391	−0.013***	8369	−0.006***	8391	−0.748***	9706	−0.025**	9548
3. Remove California and New York (CA, NY)	−0.007***	7554	−0.013***	7536	−0.006***	7554	−0.781***	8658	−0.032***	8535
4. Control for top 4 money center counties	−0.007***	9018	−0.013***	8995	−0.007***	9018	−0.777***	10,368	−0.030***	10,199
5. Remove "too-big-to-fail" banks	−0.007***	8867	−0.012***	8844	−0.006***	8867	−0.794***	10,203	−0.028***	10,048
6. Propensity score matched treatment effect	−0.001**	4339	−0.004***	4339	−0.001**	4339	−0.131***	4339	−0.010***	4339
7. 2SLS: instrument current religiosity with 1952 religiosity and lag 3 of population	−0.015***	7806	−0.030***	7799	−0.013***	7806	−1.818***	9147	−0.045***	8621
8. Random effects, het. robust, cluster by banks	−0.005***	9018	−0.011***	8995	−0.006***	9018	−0.595**	11,063	−0.029***	10,199
9. Cluster standard errors by county	−0.006***	9018	−0.012***	8995	−0.006***	9018	−0.752***	11,063	−0.029***	10,199
10. Control for regional dummies	−0.005***	9018	−0.008**	8995	−0.004***	9018	−0.224	11,063	−0.033***	10,199
11. Control for state coincident index	−0.006***	9018	−0.011***	8995	−0.006***	9018	−0.724***	11,063	−0.029***	10,199

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

To account for the self-selection of locations by banks, we employ a propensity score matched (PSM) treatment effect model. For each year, we partition the counties in our sample into three terciles by *Religiosity*: least religious, moderately religious, and most religious. Using a logit model with the full set of control variables used in Table 3 regressions, we next predict the probability of a bank being located in one of the most religious counties. Then using the nearest neighborhood of the probability, for each bank that is actually located in a county in the highest tercile of religiosity (i.e., the treatment sample), we find another bank located in the rest of the counties that has the closest propensity score with a caliper of 0.0001 (i.e., the control sample, matched with replacement). We expect the average risk of the bank-years in the treatment group (i.e., banks located in the most religious counties) to be less than that in the control sample (i.e., otherwise similar banks located in less religious counties). Panel A of Table A.2 in the IA reports the model that predicts the probability of a bank being located in the top tercile by county-level religiosity; Panel B reports the difference in the characteristics of the treatment and the control samples; Panel C shows the distribution of the difference in propensity scores; and Panel D shows the computation of the average treatment effect of the treated (ATET).[14] Row 6 of Table 5 summarizes these ATET and shows that, consistent with this prediction and the results from our baseline specification, banks in the most religious counties exhibit significantly less risk and lower market valuations than those in the less religious counties, even after controlling for the possibility of self-selection.

Next, to address the issue of endogenous movement of demographics, we employ a two-stage least squares (2SLS) method, where we use a county's religiosity in 1952, the first year that ARDA collected such data, as an instrument for its contemporaneous religiosity. This identification strategy is an improvement over those of Hilary and Hui (2009) and Kumar et al. (2011) who use lagged religious compositions as an instrument. This instrument satisfies the relevance criterion because the level of religiosity in 1952 is likely to be highly correlated with the current level of religiosity because of path-dependence. Importantly, since this instrument is historical and time-invariant, it plausibly also satisfies the exclusion restriction. Our sample starts in 1994 and ends in 2010, so it is unlikely that the cross-sectional variation in religiosity of 42–58 years in the past directly affects a bank's current policies, except through its influence on current religiosity. Moreover, it is unlikely that people choose where to locate based on their expectations about the policies of local firms several decades in the future. A caveat is that this instrument is valid only to the extent that any correlation between local religiosity and potential omitted variables (e.g., time-varying growth opportunities, competition, or regulatory differences) does not persist over time. In addition, following Hilary and Hui (2009), we also use a 3-year lag of log of population as a second instrument, which allows us to do a test for exclusion using Hansen's J-statistic.[15] Table A.3 of the IA shows the results of both stages of this regression. The first-stage results indicate that these two instruments are significant both individually and jointly[16] in predicting contemporaneous religiosity, and thus satisfy the relevance criterion. They also yield a statistically insignificant Hansen's J-statistic ($p = 0.9301$) and

[14] In the regression in Panel A of Table A.2, the area under the receiver operating characteristic Curve (AUC) is 0.74, which exceeds Hosmer and Lemeshow's (2000) recommended threshold of 0.70 for a good prediction model. In Panel B, the sample size for the treated group is less than one-third of the sample size in the Panel A regression because we apply a restrictive caliper to the propensity scores, so some treatment firms do not find a suitable control. And in Panel B, the sample size for the untreated group is less than that for the treated group because matching is by replacement. There are no statistically significant differences in the means of bank characteristics between the treatment and control groups in Panel B. Apart from minor differences in population and the fractions of women and republicans, there are also no statistically significant differences in the means of county characteristics between the two groups. There are several statistically significant but economically small differences in medians. However, the differences in propensity are negligible as Panel C shows. Moreover, any differences are further controlled for bank- and county-level characteristics in the regressions reported in Panel E that include only treatment and control firms. The results from these estimates are similar to those from our main tests.

[15] We thank an anonymous referee for suggesting this instrument.

[16] Joint significance is tested by the p-value for under-identification from a chi-squared test, which is equivalent to the F-test because the denominator degrees of freedom approaches infinity.

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thus pass the test of exclusion. Row 7 of Table 5 reports the coefficient on instrumented *Religiosity* from the second-stage regression. The results are statistically significant and qualitatively similar to our baseline results. So the observed positive relations between local religiously and bank risk-taking or valuation are unlikely to be driven by endogenous shifts in demographics.

The next robustness check aims at testing whether bank-specific unobserved heterogeneity is driving our results. If the explanatory variable of interest has substantial time-series variation, unobserved heterogeneity across banks is best controlled by using a bank fixed-effects model. But that model is inappropriate here due to limited time-series variation in the level of a county's religiosity. So we employ a random effects model, which relies on stronger assumptions about the error correlation structure, but can estimate the effect of time-invariant covariates in panel data.[17] We correct the standard errors for heteroscedasticity and cluster within banks. In row 8 of Table 5, the results from the random effects model are similar to those from our main specification.

To address the possibility that the policies of different banks located in a given county might be correlated, we cluster the standard errors at the county level instead of bank level. In row 9 of Table 5, our results remain essentially unchanged when we do so.

The next test examines whether our results are driven by time-invariant regional heterogeneity rather than religiosity. To do so, we control for dummy variables representing broad geographic regions of the US: Southeast, Midwest, Southwest, and the West (Northeast is the omitted dummy variable). This exercise poses a big hurdle to statistical significance because *Religiosity* tends to have limited cross-sectional variation within a region so these regional dummies subsume at least a part of the effect of religiosity. Despite this, in row 10 of Table 5, *Religiosity* continues to take a negative sign in predicting all risk and valuation measures and is highly statistically significant in four out of the five regressions.[18]

Finally, in row 11 of Table 5, we control for a broader measure of local economic conditions using the state coincident index, which summarizes a state's current economic conditions by combining four indicators: non-farm payroll employment, average hours worked in manufacturing, unemployment rate, and wage and salary disbursements. We obtain these data, available on a monthly frequency, from the Federal Reserve Bank of Philadelphia, and average it for a year. Our main results continue to hold when we control for this broader measure of a state's economic condition instead of per capita income.

6.2. Analysis of large changes in county religiosity

The analysis in this section aims at mitigating any lingering concerns that county-specific fixed factors might be driving the observed relations. The level of a community's religiosity tends to change very slowly, making it impractical to implement a bank fixed-effects model to examine the relation between year-by-year variation in within-bank religiosity and risk-taking. To get around this issue, we estimate the effects of large changes in local religiosity over a longer period of time on changes in bank risk-taking. Specifically, we employ the following parsimonious regression model in which 5-year changes in counties' religiosity explain the changes in bank risk-taking over the same period.

$\Delta_5(BankRisk) = b_o + b_1\ Large\Delta_5Religiosity + b_2\ Small\Delta_5Religiosity + year\ fixed\ effects$,where $\Delta_5(BankRisk) = BankRisk_t - BankRisk_{t-5}$; and $Large\Delta_5Religiosity$ $(Small\Delta_5Religiosity) = 1$, if $[Religiosity_t - Religiosity_{t-5}]$ is in the top (bottom) quintile of the sample during year t; and 0 otherwise. We calculate these changes on a rolling basis and thus maintain the panel structure of the data. As always, standard errors are corrected for heteroscedasticity and clustered within banks.

Our first hypothesis implies that $(b_1 - b_2) < 0$, i.e., banks that experience the largest increase in local religious populations decrease their risks significantly more than those that experience the smallest increase in such populations. For this analysis, we exclude 2007 and later years because the financial crisis might have radically changed the demographic compositions of some counties due to the success or failure of local institutions, which makes the inference of cause and effect difficult. In untabulated results from the regressions of each of the four risk variables, *Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, *ZScoreInverse*, (b_1, b_2) pair obtains point estimates of $(-0.002, 0.001)$, $(-0.004, 0.002)$, $(-0.002, 0.001)$, and $(-0.042, 0.017)$ with t-statistics pairs of $(-2.40, 1.26)$, $(-2.36, 1.03)$, $(-2.19, 1.35)$, $(-2.01, 0.96)$, respectively. More importantly, consistent with our hypothesis and confirming our baseline results, the estimates of $(b_1 - b_2)$ are different from zero at the 1% level of statistical significance for all four measures of risks. Although not bulletproof, these results suggest a dynamic influence of local religiosity on bank risk and offer some assurance that fixed county characteristics are not driving the observed results.

7. Analysis of financial crises

7.1. Influence of crises on the relation between religiosity and risk or value

The financial crises of 1998 and 2007–08 are interesting periods because the ramifications of these crises on banks were largely unpredicted. Recent studies find that bank cultures and policies such as CEO pay, risk management, and business models that prevailed before the crisis contributed to banks' fates during the crisis (see, e.g., Berger and Bouwman, 2013; Ellul and Yerramilli, 2013; FPS, 2012). Therefore, these episodes offer another experimental setting to help establish a causal relation between local religiosity and risk because the shocks to the banks were quasi-exogenous, unexpected, and simultaneous.[19] As Hutton et al. (2014) suggest, the

[17] In Section 6.2, we employ an alternate approach to tackle this issue by analyzing counties that experience large changes in religiosity.

[18] An alternate approach would be to use state fixed effects. But banks generally tend be headquartered in just one or two large cities within a state, so there is not enough variation in religiosity in the sample counties within a state. Perhaps because of this, with state fixed effects, while the sign on *Religiosity* remains negative for all the variables of interest, it remains statistically significant only for *Tobin's Q*.

[19] For example, Brockman et al.'s (2015) findings suggest that insiders of financial firms were unaware of the timing and extent of the financial crisis.

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differences in risk outcomes from such shocks can be attributed to differences in banks' management styles after controlling for other relevant factors.[20] We employ the following regression specification to investigate whether the relation between local religiosity and bank risk became more prominent during the peak of the crises:

$$BankRisk_{i,k,t} \text{ or } BankDistress_{i,k,t} \text{ or } BankValue_{i,k,t} = \alpha + \beta_1 Religiosity_{k,t} + \beta_2 Religiosity_{k,t} * Crisis_t + \beta_3 Crisis_t + \gamma \text{BankLevelControls}_{i,t} + \delta \text{CountyLevelControls}_{k,t} + Year_{t,-Crisis} + \varepsilon_{i,k,t} \quad (2)$$

This regression framework is similar to specification (1) in Section 4, except that we introduce the crisis period dummy (*Crisis*) and its interaction with *Religiosity* as two additional explanatory variables. Following Fahlenbrach et al. (2012) and Ellul and Yerramilli (2013), we define *Crisis* as fiscal years 1998 (if it ended in August or later), 2007, and 2008. Even though the recent financial crisis did not end in 2008, the prior literature considers years 2007 and 2008 as the most relevant period because later losses were mostly driven by uncertainty regarding government takeover of banks. $Year_{t,-Crisis}$ stands for year fixed effects except for years 1998, 2007, and 2008, which are controlled by the *Crisis* variable. Other control variables are the same as in the regression specification (1) in Section 4. The coefficient estimate of β_2 captures the incremental influence of local religiosity on bank risk and performance during the crises. Importantly, at least part of β_2 can be considered a causal effect because, to the extent that crises are unexpected, the matching of local culture and bank policies is exogenous to the crisis (see Custódio and Metzger, 2013).[21] Finally, we analyze two more dependent variables to illustrate differences in the extent of banks' financial distress during the crises.

Columns 1–4 of Table 6 present the regressions of our four risk measures. Columns 5 and 6 introduce the two new dependent variables, namely, nonperforming loans (*NPL Ratio*) and dividend payout (*Div. Payout*). The first thing to notice in Table 6 is the effect of crises on our four risk variables. The positive and highly significant coefficient on the *Crisis* variable suggests that during crises, all banks on average experience higher total and idiosyncratic volatilities, face more extreme price drops (tail risk), and move closer to default (the inverse of z-score). More importantly, the main explanatory variable of interest, *Religiosity*Crisis*, obtains a significantly negative coefficient in predicting each of the risk variables. Together, these results suggest that while the financial crisis brought about significant extra risk both in terms of market-based measures and z-scores, banks in more religious counties experienced less of this extra risk. The effect of *Religiosity* remains significantly negative in explaining each of the four risk variables.

Results from two additional regressions further support the hypothesis that banks in more religious areas were less severely distressed during the crisis. First, column 5 presents the results of the regression of nonperforming loans (*NPL Ratio*). As expected, the main effect of *Crisis* is significantly positive, indicating an increase in *NPL Ratio* during the crises. The main effect of *Religiosity* is not significant but the interaction of the two is negative and significant. This result suggests that while the level of local religiosity does not predict *NPL Ratio* in general, banks in more religious areas face significantly lower surge in bad loans during the crisis. These bad loans do not seem to be driven by real estate loans. In untabulated results, a similar regression of real estate loan loss obtains a negative but statistically insignificant coefficient on *Crisis*Religiosity*.

Second, we examine the impact of the crises on the relation between local religiosity and dividend payout. We define payout as cash dividends scaled by 2 year lagged book assets. Following Allen and Michaely (2003), and Li and Zhao (2008), we scale dividends by book assets, instead of stock price or earnings, to ensure that the results are not driven by stock price variation or negative earnings. The choice of 2 years of lag of book assets is to ensure that the scaling variable falls outside the crisis period (since the recent financial crisis lasted for roughly 2 years).[22] We focus the analysis of dividends on the sample of banks which paid non-zero cash dividends 2 years ago. Column 6 of Table 6 presents the result of the regression of dividend payout among dividend paying banks. The main effect of *Crisis* is negative and significant, consistent with the fact that many banks are forced to cut dividends during crises. However, the positive and highly significant coefficient on the interaction of *Religiosity* and *Crisis* reveals that banks in more religious areas had to reduce their dividend payouts less during the crises. Given that firms are generally reluctant to cut dividends, the decision to cut dividends is a sign of financial stress. The finding that banks located in more religious counties had to cut dividends less reinforces our conclusion that these banks were less stressed during the crises.

Finally, in column 7, the analysis of *Tobin's Q* suggests that banks lost significant values during the crisis as revealed by the significantly negative coefficient on the *Crisis* variable. However, the coefficient on the interaction of *Religiosity* and *Crisis* is significantly positive, revealing that banks in more religious areas suffered less value destruction during the crises. As before, the main effect of *Religiosity* in predicting *Tobin's Q* remains significantly negative.

7.2. Local religiosity and vulnerability to crises

This analysis is motivated by FPS's (2012) findings that banks whose stock performed poorly in the crisis of 1998 also performed poorly in the crisis of 2007–08. The authors explain this result by arguing that some persistent risk cultures or business models,

[20] Custódio and Metzger (2013) also exploit unexpected changes in business conditions to parse out the causal effect of CEOs' financial expertise on firm policies.

[21] Specification (2) is similar to a difference-in-differences (DiD) model, where the time dimension (before vs. after) is captured by the *Crisis* variable, and the treatment dimension (control vs. treatment) is captured by the *Religiosity* variable. The treatment variable, *Religiosity*, is continuous here, instead of a binary variable commonly used in DiD settings. The difference-in-differences is captured by the interaction of *Crisis* and *Religiosity*.

[22] Our conclusions remain unchanged if we use the natural log of dollar cash dividends (no scaling), or the percentage change in cash dividends from 2 years ago (both winsorized at 0.5% in both tails).

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Table 6
The effect of financial crises.
Panel A of the table reports estimates of regressions of risk outcomes (*Total Risk*, *Tail Risk*, *Idiosyncratic Risk*, and *ZScoreInverse*), financial stress measures (*NPL Ratio* and *Div. Payout*), and valuation (*Tobin's Q*) on the religiosity proxy, *Religiosity* and its interaction with the crisis period dummy, *Crisis* indicating fiscal years 1998 (if it ended after July), 2007, and 2008. All variables are defined in the Appendix. Other control variables, not reported for brevity, are the same as in Table 3. All regressions include year dummies. Intercepts are not reported. Standard errors are corrected for heteroscedasticity and are clustered at the bank level, and *t*-statistics are in parentheses. Panel B shows the results from cross-sectional regression of buy-and-hold returns from July 2007 to December 2008 (*Return 2007–08*) on buy-and-hold returns from August to December 1998 (*Return 1998 Aug.-Dec*). Standard errors are corrected for heteroscedasticity.

Panel A: Effect of the crises on risk outcomes, financial stress measures and valuation.

	(1) Total risk	(2) Tail risk	(3) Idio. risk	(4) ZScoreInv.	(5) NPL ratio	(6) Div. payout	(7) Tobin's Q
Crisis*Religiosity	−0.008***	−0.017**	−0.009***	−0.416**	−0.947***	0.001***	0.033***
	(−2.75)	(−2.46)	(−3.24)	(−2.23)	(−3.03)	(2.59)	(3.07)
Religiosity	−0.005***	−0.010***	−0.005***	−0.703***	0.027	−0.001**	−0.031***
	(−3.40)	(−3.06)	(−3.00)	(−2.98)	(0.17)	(−2.19)	(−3.32)
Crisis	0.013***	0.032***	0.011***	0.589***	0.903***	−0.002***	−0.059***
	(6.35)	(6.94)	(6.00)	(3.55)	(4.79)	(−2.89)	(−7.40)
Bank-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	9018	8995	9018	11,063	10,467	7168	10,199
Adj. R^2	0.473	0.482	0.473	0.192	0.428	0.240	0.450

Panel B: Predicting the buy-and-hold return for the 2007–08 crisis with the return for the 1998 crisis.

	(1) Return 2007–08	(2) Return 2007–08 (Religiosity 2006 > Median)	(3) Return 2007–08 (Religiosity 2006 < Median)	(4) Return 2007–08 (Religiosity 2006 > Median)	(5) Return 2007–08 (Religiosity 2006 < Median)
Return 1998 Aug.–Dec	0.365**	0.160	0.655***	0.163	0.542**
	(2.48)	(0.72)	(3.11)	(0.71)	(2.30)
Stock return 2006	−0.024	−0.111	0.024	−0.133	−0.157
	(−0.15)	(−0.56)	(0.10)	(−0.68)	(−0.47)
Tobin's Q 2006	2.391***	3.059***	1.051	3.364***	1.112
	(3.04)	(3.29)	(0.77)	(3.38)	(1.00)
Tail risk 2006	−17.965***	−18.462***	−18.778**	−15.870***	−12.367
	(−3.88)	(−3.22)	(−2.37)	(−2.73)	(−1.43)
Idiosyncratic risk 2006	−47.104***	−54.969***	−37.159*	−51.058***	−23.495
	(−3.94)	(−3.47)	(−1.86)	(−3.03)	(−1.00)
Tier 1 capital ratio 2006	0.017*	0.026*	0.001	0.023*	0.020
	(1.69)	(1.96)	(0.09)	(1.75)	(1.06)
Log(market cap 2006)	−0.025	−0.017	−0.028	−0.008	0.032
	(−1.56)	(−0.93)	(−0.80)	(−0.39)	(0.86)
Market leverage 2006	0.021	0.034	−0.007	0.038	0.011
	(1.18)	(1.44)	(−0.26)	(1.61)	(0.35)
County-level controls	No	No	No	Yes	Yes
Obs.	235	138	97	136	90
Adj. R^2	0.174	0.171	0.153	0.181	0.245

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

which are either profitable in good times or are difficult to change, make some banks more susceptible to crises. We examine whether differences in local religiosity serve as a source of cross-sectional variation in such persistent risk culture or business model. The view that local religiosity infuses conservatism in financial decisions implies either that banks in more religious areas follow a more defensive risk culture that makes them less vulnerable to crises, or that they are more likely to become alarmed by previous crises and be better prepared for subsequent ones. So, in FPS's (2012) empirical framework, we expect that the explanatory power of stock performance in the 1998 crisis on the performance of the 2007–08 crisis should be weaker among banks located in more religious areas.

To test this conjecture, we use the sample of banks that are in the sample both in 1998 and 2008, and estimate a cross-sectional regression similar to that in Fahlenbrach et al. (2012). Panel B of Table 6 shows the regression estimate in which the dependent variable is the buy-and-hold return from July 2007 to December 2008 (*Return 2007–08*) and the main explanatory variable of interest is the buy-and-hold return from August 1998 to December 1998 (*Return 1998 Aug–Dec*). All bank-level control variables are measured at the end of fiscal year 2006.[23] Column 1 largely replicates the main results of Fahlenbrach et al. (2012) using control variables similar

[23] Most control variables used in this regression are defined in the Appendix (without the suffix 2006). Among the rest, *Stock Return 2006* is the holding period stock return for 2006, *Log*(*Market Cap 2006*) is the natural logarithm of market capitalization (Compustat: PRCC_F*CSHO) at the end of fiscal year 2006, *Market Leverage 2006* is book value of assets minus book value of equity plus market value of equity, divided by market value of equity (Compustat: (AT - SEQ + PRCC_F* CSHO)/(PRCC_F* CSHO)).

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to those that are significant in their Table 2, column 7. In particular, the estimates from column 1 confirm the findings of Fahlenbrach et al. (2012) that the crisis return of 1998 positively and significantly predicts the crisis return of 2007–08.

To test our conjecture that this effect should be weaker among banks in more religious areas, we partition the sample into banks located in counties with above- and below-median religiosity at the end of fiscal year 2006, and estimate two separate cross-sectional regressions. As conjectured, *Return 1998 Aug–Dec* does not significantly predict *Return 2007–08* in the sample of banks located in more religious areas, as shown in column 2. But in the sample of banks located in less religious areas, *Return 1998 Aug–Dec* obtains a four-times as large and highly statistically significant coefficient in explaining *Return 2007–08*, as shown in column 3. A formal test finds that the coefficients on *Return 1998 Aug–Dec* in these two subsamples are statistically different from each other ($p < .10$). The results are similar in columns (4) and (5) when we add the county-level control variables used in Table 3. These results are consistent with the notion that, compared to banks in less religious areas, banks in more religious areas either follow less aggressive risk cultures and business models that are less vulnerable to crises, or they are more alarmed by past crises and prepare better for the next crisis.

In sum, our findings suggest that local religiosity makes banks take less risk, and accept lower market valuations. This effect of local religiosity on risk and some financial distress indicators is magnified during the crises. Local religiosity also makes banks more immune to financial shocks. The finding that banks in less religious locations take more risk and command higher valuations in normal times at least partly explains why some banks choose to persistently adopt riskier policies, even by remaining vulnerable to crises. These results collectively imply that there exists a trade-off in risk and return in bank investments, and that banks in more religious areas choose to take less risk even by foregoing some potential value during normal times.

8. Policies underlying risks

Our analysis so far shows that differences in local religiosity significantly explain the differences in bank risk outcomes and valuations. A pertinent follow-up question is what actions these banks take that lead to such differences in observed risk-taking behaviors. In this section, we attempt to identify banks' investment policies and compensation structure as underlying policy channels that potentially lead to such differences in risks. In doing so, we rely on the previous literature as well as the results from our analyses earlier in this paper.

8.1. Investment policies: Growth and risky business model

Results shown in Table 3 give some insights into the policy variables that might be responsible for the differences in banks' risk outcomes. First, in Table 3, there is a clear nonlinear effect of size on three measures of risk. The negative coefficient on *Size* suggests that large size helps reduce risks up to a point, but the positive and highly significant coefficient on $Size^2$ indicates that extremely large size, possibly gained from rapid asset growth, might be a cause of higher risk. Consistently, Rossi (2010) finds that rapid asset growth is a significant factor driving bank insolvency; Demsetz and Strahan (1997) document that diversification benefits of risk-reduction offered by large bank size is offset by other riskier strategies that banks adopt, and Fahlenbrach et al. (2012) show that banks which grew more rapidly until 2006 performed more poorly in the financial crisis of 2007–08. Furthermore, Ellul and Yerramilli (2013) point out a potential convex relation between size and off-balance sheet activities. Accordingly, we analyze if banks in more religious counties grow their assets slowly to limit risks.[24]

Second, an alternative *ex ante* proxy for the extent of asset risk-taking is write-downs. Banks are required to record write-downs on a wide range of investments on the basis of their ex ante riskiness even if these assets do not become impaired later. We measure *Write-downs* by adding up provisions for credit losses, other provisions, pre-tax write-downs, losses on investment securities, and allowances for reserves for other losses, and scale the sum by total assets.

Third, prior literature finds that involvement in non-traditional banking (as measured by the fraction of non-interest income) makes banks riskier because revenue from interest is more certain than revenue from other sources such as investment banking, venture capital, and trading activities (see, e.g., DeYoung and Roland, 2001; Stiroh and Rumble, 2006; and Brunnermeier et al., 2012). Consistently, in Table 3, the coefficient on non-interest income is positive and significant in predicting three of our risk variables. Thus, our next policy variable of interest is the share of non-interest income in a bank's total income.

Table 7 presents the results of regressions of these potential policy mechanisms. Control variables include bank-specific and (untabulated) county-level variables in Table 3. In column 1, the coefficient estimate of *Religiosity* is significantly negative in the regression of *Asset Growth*, which suggests that banks in more religious counties grow their assets more slowly. These banks appear to do so by limiting their investments to safer assets. This view is supported by estimates from the regression of *Write-downs*, a measure of ex ante asset risk, in column 2, where *Religiosity* again obtains a significantly negative coefficient estimate. In column 3, the coefficient estimate of *Religiosity* is also significantly negative in the regression of *Non-interest Income*. This result suggests that banks in more religious counties generate less of their income from non-interest sources, which are generally riskier than interest income generated from traditional lending.

[24] Another potential way to assess the riskiness of assets is to examine risk-weighted assets to total assets ratio (RWA). Risk-weighted assets are defined as the weighted average of different bank assets, where higher weights denote increasing level of riskiness as guided by bank regulation. The results from RWA regressions are similar to those from asset growth regressions. However, the usefulness of risk-weighted assets ratios is somewhat controversial (see, e.g., Leslé and Avramova (2012)).

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Table 7
Potential policy mechanisms for risk-taking.
The table reports estimates of regressions of policy mechanisms for risk-taking (*Assets Growth*, *Write-downs*, *Non-interest Income*, *Option Grants*, and *CEO Vega*) on the religiosity proxy, *Religiosity*. All the variables are defined in the Appendix. County-level control variables, not reported for brevity, are the same as in Table 3. All regressions include year dummies. Intercepts are not reported. Standard errors are corrected for heteroscedasticity and are clustered at the bank level, and t-statistics are in parentheses.

	(1) Asset growth	(2) Write-downs	(3) Non-interest income	(4) Option grants	(5) CEO vega
Religiosity	−0.040**	−0.265***	−0.056**	−1.060***	−152.538**
	(−2.42)	(−4.59)	(−2.41)	(−2.59)	(−1.99)
Size	−0.007***	0.109***	0.053***	0.648***	−119.274***
	(−3.06)	(10.54)	(12.80)	(11.19)	(−2.78)
Size^2	0.005**	0.004	0.017***	−0.207***	141.587***
	(2.51)	(0.55)	(4.98)	(−4.27)	(5.08)
ROA	0.511	−14.630***	0.773**	3.687	3623.478***
	(1.34)	(−8.24)	(2.18)	(0.74)	(3.09)
NPL ratio	−2.194***	16.620***	0.921***	−15.732***	683.903
	(−12.97)	(14.89)	(5.01)	(−4.74)	(0.90)
Loans/assets	0.123***	0.484***	−0.197***	0.827**	−117.249*
	(7.27)	(9.01)	(−7.36)	(2.10)	(−1.74)
Deposits/assets	0.076***	0.298***	−0.003	1.230**	2.399
	(3.59)	(3.89)	(−0.09)	(2.53)	(0.03)
Tier 1 capital ratio	0.003***	0.006***	−0.003***	0.001	0.014
	(5.72)	(3.23)	(−5.36)	(0.05)	(0.00)
Non-interest income	0.034**	0.172**		0.470*	188.550***
	(2.38)	(2.23)		(1.80)	(2.90)
Acquisition activity	0.001	0.049	0.031***	0.198**	15.273
	(0.23)	(1.30)	(4.15)	(2.40)	(0.72)
County-level controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	10,467	10,464	9892	3994	1411
Adj. [Pseudo] R^2	0.130	0.437	0.323	[0.080]	0.549

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

8.2. Compensation structure

The use of incentive pay in banking is widely believed to have contributed to excessive risk-taking by banks and led to their poor performance during the crisis. In corporate finance literature, the link between executive incentive to increase risk – especially due to their option compensation – and firm risk-taking is well-established (see, e.g., Coles et al., 2006). Recent studies also find this relation in the banking industry (see, e.g., DeYoung et al., 2013; and Mehran and Rosenberg, 2008).

We investigate whether one way banks in more religious areas maintain lower risks is by offering lower incentives to their key employees to increase risks. To do so, we first examine the value of stock options granted to all employees in a bank, which is reported in Compustat Bank Fundamentals file since fiscal year 2004. Since the value of an option increases with the volatility of the underlying asset, higher option compensation provides an incentive to bank executives to undertake riskier projects.[25] Second, to more precisely identify executives' risk-taking incentives arising from stock option grants, we follow the previous literature and examine the vega of CEO options, which estimates the change in CEO wealth with respect to changes in banks' stock return volatility. However, the analysis of vega is possible only for the subsample of bank-years that intersects with the Execucomp database, which has all the relevant information needed to calculate vega using Core and Guay's (2002) methodology.

About one-half of the bank-years do not have any option grants even after 2004, so this variable is censored at zero. Therefore, we estimate a Tobit regression of the natural log of one plus the number of options granted to all employees in a given year (*Options Grant*) on *Religiosity*. The results shown in column 4 of Table 7 suggest that employees of banks located in more religious counties receive less stock options as a part of their compensation, so they have lower incentives to take risk. The results in column 5 reinforce this conclusion by showing that *Religiosity* negatively predicts CEO vega, which represents a more direct incentive to take risk. Overall, these results suggest that banks in more religious areas are able to maintain lower risk levels by providing less risk-taking incentives to their CEO and key employees, limiting their growth by investing in safer projects, and sticking to more traditional, safer businesses.

8.3. Other plausible channels: Off-balance sheet activities and leverage

Any discussion of bank risk-taking is perhaps incomplete without mentioning structured financial products, such as mortgage-backed and asset-backed securities and credit derivatives. Since these instruments played a key role in the crisis of 2007–08, it is natural to

[25] Compustat Bank Fundamentals database does not provide enough information to calculate option delta and vega.

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wonder to what extent banks' risk-taking behaviors predicted by local religiosity are attributable to their involvement in these off-balance sheet activities.

We follow Ellul and Yerramilli (2013)) and obtain data on private mortgage-backed securities, and derivatives for trading and hedging purposes from FR Y-9 statements of bank holding companies from the Bank Regulatory database accessed via WRDS. We merge these data with the Compustat bank fundamentals data on the basis of fiscal year-end dates. In multiple regressions, *Religiosity* obtains negative but statistically insignificant coefficients in predicting the ratios to total assets of private mortgage-backed securities ($t = -1.34$), derivatives held for hedging purposes ($t = -0.89$), and derivatives held for trading purposes ($t = -0.53$). The lack of significant differences in these off-balance sheet activities is not very surprising, given that this study focuses on depository institutions, all of which face the same legal environment and permissible business practices. Moreover, Calomiris and Nissim (2014) find that most variations in banks' valuations come from traditional lending and deposit-taking activities. So it appears that the differences we observe in banks' risk-taking due to local religiosity pertain to their normal business.

We also do not find significant evidence of local religiosity predicting banks' leverage ($t = -1.27$) in a multiple regression setting. This finding is congruent with Hilary and Hui (2009), who find the influence of local religiosity mainly on firms' investment policies.

9. Secondary predictions: importance of local preference

We find that banks located in more religious areas take less risk, and argue that the underlying channel is the effect of religiosity on the risk aversion of local investors and key executives. This argument implies our third hypothesis that the relation between local religiosity and bank risk taking should be stronger in banks for which local residents are economically more important as investors or executives. To test it, we identify three indicators of the importance of local investors and executives for a bank. The first indicator is bank size because smaller firms are more likely to rely on local investors (see, e.g., Becker, Ivković, and Weisbenner, 2011), as well as local executives (see, e.g., Yonker, 2015). Second, Hong et al.'s (2008) findings suggest that local investors are more important for banks located in areas with lower investment opportunities compared to local investment demand. This is because each existing firm receives a larger share of local investments. To capture this "only-game-in-town" effect, we follow Hong et al. 2008 and create a variable, *BE/PI*, calculated as the aggregate book equity (BE) of all the public companies in a county divided by the aggregate personal income (PI) of all residents of the county in a given year.[26] Third, the effect of religiosity on risk should be stronger among banks with higher individual ownership (i.e., lower institutional ownership) because individual investors tend to be more locally biased (Zhu, 2003) and are more prone to behavioral biases (Bailey et al., 2011) than institutional investors.

Panel A of Table 8 shows the results from regressions of each of our four risk measures on samples partitioned at the median by bank size (Panel A.I), BE/PI (Panel A.II), and institutional ownership ratio (IOR, Panel A.III). The negative effect of *Religiosity* on each risk variable is largely confined to banks that depend more on local investors and executives, viz., banks that are smaller,[27] located in low BE/PI areas, or have lower institutional ownership. The effects are quite large for them and are highly statistically significant. For the sample of banks that depend less on local residents, the effect is small and statistically insignificant at the 5% level. These results provide strong support for our third hypothesis that the negative relation between local religiosity and bank risk is stronger in banks for which local residents are economically more important as investors or executives.[28]

Panel B presents a similar analysis of local residents' importance on the relation between religiosity and the risk-taking policy mechanisms discussed in Section 7.[29] The conclusion from the analysis of policy mechanisms is similar to that from the analysis of risk-taking outcomes presented in panel A. In all cases except one, the effect of local religiosity on each risk-taking policy (*Asset Growth*, *Write-downs*, *Non-interest Income*, and *Option Grants*) is stronger in subsamples of smaller banks, banks in low BE/PI areas, and banks with lower institutional ownership. Collectively, these results suggest that our finding of lower risk-taking by banks in more religious areas is at least partly due to the greater risk aversion of local residents.

10. Religious affiliations

Our main focus in this paper is the *level* of local religiosity, rather the distribution of different religious beliefs, because theory and prior empirical evidence offer a clear prediction on the effect of religiosity on risk-taking. In this section, we briefly analyze the role of different religious groups, a point on which the prior literature is inconclusive.

Hilary and Hui (2009) find that a large percentage of either Catholic or Protestant residents in an area negatively predicts risk-taking by non-financial firms. However, Weber (1930) and subsequent empirical studies such as Stulz and Williamson (2003)

[26] We proxy a county's per capita income by its state's per capita income and multiply it by the county's population.

[27] The sample sizes for small banks are lower than for large banks because of more missing CRSP and Compustat data for small banks. This is especially so in regressions of the first three risk measures, which require both Compustat data and CRSP daily stock returns. The results are similar if we rank the size and IOR variables conditional on having all the variables needed in the regression.

[28] Samples partitioned by bank size and by IOR might be similar due to a positive correlation between these two variables. So, one concern is that this test might not have any new information. We find that IOR and firm size have a correlation of +0.61. To address this issue, we partition our sample of banks into four groups: Small Low, Small High, Large Low, and Large High, where Small Low is the group of small banks (i.e., below-median asset size) with low (i.e., below median) IOR, Small High is the group of small banks with above median IOR, etc. We then estimate separate regressions for each of these four subsamples. Table A.4 of the IA shows that within each size group, the coefficient estimate on *Religiosity* is more negative for banks with lower IOR for each risk measure. Similarly, within each IOR group, the coefficient estimates are more negative for smaller banks. Thus, both size and IOR appear to independently measure the importance to a bank of local investors and executives.

[29] This analysis excludes regressions of CEO vega incentives where workable subsample partitions are not feasible because of much smaller sample sizes.

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Table 8
Effect of local preferences (bank size, local bias, and institutional ownership).
This table reports the analysis of the effect of the religiosity proxy, *Religiosity* on risk outcomes (Panel A) and policy mechanisms for risk-taking (Panel B) on subsamples partitioned by bank size, local investment opportunities relative to investment demand, and institutional ownership ratio. All the variables are defined in the Appendix. *Small* (*Large*) *Banks* indicates the subsample of banks below (above) median asset size a given year. *Low* (*High*) *BE/PI* corresponds to the subsample of banks in below- (above-) median *BE/PI* counties in a given year. *BE/PI* equals the total book equity of all public companies headquartered in a county during a year divided by the aggregate personal income of all residents of the county during the year. *Low* (*High*) *IOR* corresponds to the subsample of banks with below- (above-) median institutional ownership ratio in a given year. Control variables, not tabulated for brevity, in the regressions in panel A (B) are the same as in Table 3 (6). Intercepts are not reported. Standard errors are corrected for heteroscedasticity and clustered at the bank level, and *t*-statistics are in parentheses.

Panel A: Effects of local preferences on risk outcomes.

	Total risk		Tail risk		Idiosyncratic risk		ZScoreInverse	
I. Samples partitioned by bank size								
	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks
Religiosity	−0.010***	−0.003*	−0.018***	−0.005	−0.009***	−0.002	−0.526*	−0.465
	(−3.62)	(−1.83)	(−3.18)	(−1.56)	(−3.56)	(−1.52)	(−1.91)	(−1.57)
Obs.	3943	5061	3929	5052	3943	5061	5275	5788
II. Samples partitioned by relative local investment opportunities								
	Low BE/PI	High BE/PI	Low BE/PI	High BE/PI	Low BE/PI	High BE/PI	Low BE/PI	High BE/PI
Religiosity	−0.011***	−0.005	−0.021***	−0.010	−0.010***	−0.005	−1.407***	−0.168
	(−3.75)	(−1.37)	(−3.65)	(−1.41)	(−3.83)	(−1.52)	(−3.65)	(−0.31)
Obs.	2718	2845	2707	2839	2718	2845	3339	3314
III. Samples partitioned by institutional ownership ratio (*IOR*)								
	Low IOR	High IOR	Low IOR	High IOR	Low IOR	High IOR	Low IOR	High IOR
Religiosity	−0.009***	−0.003*	−0.016***	−0.005	−0.008***	−0.003*	−0.929***	−0.488*
	(−3.59)	(−1.90)	(−3.28)	(−1.51)	(−3.25)	(−1.86)	(−2.94)	(−1.75)
Obs.	4211	4807	4194	4801	4211	4807	5803	5260

Panel B: Effect of local preferences on policy mechanisms for risk-taking.

	Assets growth		Write-downs		Non-interest income		Options grant	
I. Samples partitioned by bank size								
	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks
Religiosity	−0.068***	−0.013	−0.317***	−0.232***	−0.067**	−0.038	−2.144***	−0.277
	(−3.24)	(−0.55)	(−4.24)	(−2.93)	(−2.12)	(−1.25)	(−3.42)	(−0.54)
Obs.	4925	5542	4923	5541	4799	5091	1915	2078
II. Samples partitioned by relative local investment opportunities								
	Low BE/PI	High BE/PI	Low BE/PI	High BE/PI	Low BE/PI	High BE/PI	Low BE/PI	High BE/PI
Religiosity	−0.048	−0.103**	−0.353***	−0.335**	−0.160***	−0.046	−1.376*	−0.830
	(−1.42)	(−2.05)	(−3.13)	(−2.32)	(−3.67)	(−0.75)	(−1.66)	(−0.95)
Obs.	3142	3162	3141	3161	2905	2892	1129	1093
III. Samples partitioned by institutional ownership ratio (*IOR*)								
	Low IOR	High IOR	Low IOR	High IOR	Low IOR	High IOR	Low IOR	High IOR
Religiosity	−0.048**	−0.024	−0.308***	−0.231***	−0.073***	−0.029	−1.578***	−0.512
	(−2.44)	(−0.96)	(−3.95)	(−3.60)	(−2.72)	(−0.90)	(−3.02)	(−1.01)
Obs.	5456	5011	5454	5010	5307	4585	2484	1510

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

postulate that Protestantism encourages more entrepreneurship and risk-tolerance than Catholicism. Consistent with this idea, Baxamusa and Jalal (2015) find that CEOs who identify themselves as Catholics tend to take less risk. On the other hand, Kumar et al. (2011) and Adhikari and Agrawal (2016) find that Catholics appear to prefer, while Protestants shun, a specific type of risk, namely lotteries or gambling. A lottery is characterized by a positively skewed distribution, i.e., a small probability of extremely large gains and large probabilities of smaller losses. This difference in gambling preferences between Catholics and Protestants is consistent with the religious teachings and social practices of the two groups, and with the findings of a large body of prior empirical literature in economics, sociology, and more recently, financial economics. As for risk-taking more generally, while the literature is quite clear that religious people of any faith generally display greater risk aversion, it is unclear on differences across religious groups.

We find that this ambiguity is also present in our sample. We partition the religious groups into Catholics, Mainline Protestants, and Evangelical Protestants and repeat our regressions of Tables 3 and 7. Using a parsimonious model that only controls for bank size, size-squared, and ROA, we find in Panel A of Table A.5 in the IA that both the proportions of Catholics and of at least one of the Protestant groups negatively and significantly predict all ten of banks' risk-taking policies and outcomes. This result is consistent with Hilary and Hui (2009). However, in a regression with the full set of control variables shown in panel B of Table A.5, while the proportion of Catholics remains significant in negatively predicting all ten variables, the proportion of any Protestant group does so for only five of these variables.

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11. Conclusion

Why do some banks take more risk than others? This question has drawn substantial interest among academic researchers and policymakers, especially since the recent financial crisis. While there are many rationality-based answers to this question, this paper makes a unique contribution to the literature by discovering a behavioral explanation of bank risk-taking. Using a sample of publicly traded depository institutions in the US, we find that banks headquartered in more religious areas take less risk. In particular, local religiosity negatively predicts both market-based risk measures such as total, tail, and idiosyncratic risks, as well as a bank's risk of default. These results continue to hold when we use an estimate of CEO's personal religiosity instead. But banks in more religious areas command lower market valuations, especially in non-crisis times. The negative influence of religiosity on bank risks is magnified during financial crises. In times of crisis, banks in more religious areas experience lower increase in risk and less value destruction compared to other banks. Moreover, the persistence in poor bank performance during successive crises that Fahlenbrach et al. (2012) find does not hold for banks located in more religious areas. This finding suggests that the business models or risk cultures that make banks consistently vulnerable to crises prevail only in banks in more secular areas.

We uncover several policy mechanisms that appear to contribute to the observed relation between religiosity and banks' risk outcomes. In particular, banks in more religious areas seem to maintain lower risks by growing their assets less aggressively, holding safer asset portfolios, depending less on non-interest income which tends to be riskier, and providing lower risk-taking incentives to key executives. Finally, we find some evidence suggesting that the underlying channel of the negative relation between local religiosity and bank risk-taking is the effect of religion on local residents' risk aversion. Specifically, we find that the negative influence of local religiosity on bank risk is stronger among banks for which local investors and executives are more important. These results suggest that local religiosity is associated with higher risk aversion and financial conservatism of local investors and managers, whose preferences influence local banks' risk cultures.

The finding of a negative relation between local religiosity and bank risk-taking is open to two non-mutually exclusive explanations. The first is a causal explanation which suggests that local religiosity causes banks to take less risk because banks respond to the risk preferences of local investors and executives. The second is an endogenous matching explanation that in equilibrium, investors and executives get matched to banks based on shared risk preferences. We attempt to distinguish between these two explanations by using propensity score matching and an instrumental variables technique (2SLS). Moreover, we rule out several endogeneity stories and provide an analysis of large changes in local religiosity. Finally, we examine the 1998 and 2007–08 financial crises as quasi-exogenous shocks to the banking system. All of these analyses support the causal explanation.

This work contributes to the literature by uncovering an important and previously unidentified determinant of risk-taking by banks, namely religion-induced risk aversion. A potential policy implication of these findings is that regulatory interventions aimed at preventing banks from taking excessive risks should also take into account differences in inherent risk-taking propensities of banks' key stakeholders due to differences in their cultural environments.

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Appendix. Variable definitions.

Variables	Definitions
Religiosity	The number of religious adherents in a county divided by the county population in a year. Source: ARDA.
CEORel	Percentage of religious adherents in 1990 in the state where the CEO grew up.
CEORelQuintile	The quintile ranking of *CEORel* variable, where 1 is low and 5 is high.
Total risk	Standard deviation of daily stock returns over a fiscal year. Source: CRSP.
Tail risk	Average of the lowest 5% daily stock returns over a fiscal year. Source: CRSP.
Idiosyncratic risk	Standard deviation of the residuals obtained from Fama–French and Carhart four-factor model over a fiscal year. Source: CRSP and Ken French's website: mba.tuck.dartmouth.edu/pages/faculty/ken.french/
ZScore Inverse	Natural logarithm of z-score multiplied by −1, where z-score is calculated as the sum of capital-to-assets ratio (CAR) and ROA, divided by the standard deviation of ROA, $\left(\frac{ROA+CAR}{\sigma(ROA)}\right)$. We require a minimum of 3 years of non-missing ROA observations for each bank to calculate its standard deviation. Source: Compustat Bank Fundamentals.
Tobin's Q	Book value of assets plus market value of equity minus book value of equity, all divided by book value of assets ((AT + CSHO*PRCC_F - CEQ)/AT). Source: Compustat and Compustat Bank Fundamentals.
Crisis	An indicator variable that equals 1 for fiscal years 1998 (if it ended after July), 2007 and 2008; and 0 otherwise.
NPL ratio	Nonperforming loan ratio, calculated as nonperforming assets divided by total assets (NPAT/AT). Nonperforming assets are the sum of borrowed money on which the borrower has not made scheduled payments for at least 90 days. Source: Compustat Bank Fundamentals.

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Appendix (*continued*)

Variables	Definitions
Div. Payout	Common (ordinary) dividends divided by book assets of 2 years ago. (DVC_t/AT_{t-2}). Source: Compustat Bank Fundamentals.
Asset growth	Annual difference in the natural logarithm of book assets (AT). Source: Compustat Bank Fundamentals.
Write-downs	Sum of provisions for credit losses, other provisions, pre-tax write-downs, losses on investment securities, and allowances or reserves for other losses, scaled by total assets ((PCL + PVON + WDP -INVSGL + AROL)/AT).
Option Grants	Natural logarithm of one plus the fair value of options granted (OPTFVGR). Source: Compustat Bank Fundamentals.
CEO Vega	Dollar change in CEO's option holdings for a 1% change in stock return volatility, in thousands. Source: ExecuComp.
Size	Natural logarithm of total assets (AT), orthogonalized with $Size^2$. Source: Compustat Bank Fundamentals.
$Size^2$	Square of natural logarithm of total assets (AT), orthogonalized with Size. Source: Compustat Bank Fundamentals.
ROA	Net income divided by book assets (NI/AT). Source: Compustat Bank Fundamentals.
Loans/Assets	Loans net of total allowance for losses divided by book assets (LNTAL/AT). Source: Compustat Bank Fundamentals.
Deposits/Assets	Total deposits divided by book assets (DPTC/AT). Source: Compustat Bank Fundamentals.
Tier 1 Capital ratio	Risk-adjusted Tier 1 capital ratio (CAPR1). Source: Compustat Bank Fundamentals.
Non-interest income	The ratio of non-interest income to the sum of interest- and non-interest incomes (TNII/(NIINT + TNII)). Source: Compustat Bank Fundamentals.
Acquisition activity	A dummy variable indicating non-zero spending on acquisitions (AQC). Source: Compustat Bank Fundamentals.
Log-real income)	Natural logarithm of state-level per capita income, adjusted using the 2005 GDP deflator. Source: US Census Bureau
Fraction college grads	The fraction of a county's population that has a bachelor's degree or higher. Source: US Census Bureau.
Log(population)	Natural logarithm of a county's population. Source: US Census Bureau.
Average age group	Average of the indicator variable corresponding to different age groups of a county's residents. A higher number indicates an older age group. Source: US Census Bureau.
Rural urban continuum	Classification of metropolitan (metro) counties by the population size of their metro area, and nonmetropolitan (non-metro) counties by the degree of urbanization and adjacency to a metro area or areas. Scaled from 1 to 9, where a higher number means more rural: 1–3 refer to metro areas and 4–9 refer to non-metro areas. Source: US Census Bureau.
Female population ratio	Ratio of female population to total population of a county. Source: US Census Bureau.
Minority population ratio	Percentage of non-white population in a county. Source: US Census Bureau.
Republican ratio	Ratio of votes for the Republican presidential candidate in a county to the sum of votes for both Republican and Democrat candidates. Source: US Census Bureau.
Local bank concentration	Herfindahl–Hirschman index (HHI) of total deposits (DPTC) held by sample banks at the county-year level. Source: Compustat Bank Fundamentals.
House price growth	Four quarter growth of house price (all-transactions) index (estimated using sales prices and appraisal data) at the state-level. Source: Federal Housing Finance Agency.

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